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ELECTROMAGNETIC CONTROL

Up to this point, our discussion of beam formation and control has been related primarily to cathode-ray tubes using electrostatic control methods.

A second type of cathode-ray electron beam control is obtained through electromagnetic focusing and deflection by varying the relative force, position, or area of fields adjacent to the beam.

To more easily understand the overall operation of this tube, let us first review the effect of magnetic fields upon an electron beam.

EFFECT OF MAGNETIC FIELDS UPON AN ELECTRON BEAM: The stream of electrons from the beam source may be considered as equivalent to a stream of electrons in a solid conductor carrying direct current. The effect of an external magnetic field upon either stream will be the same since any flow of electrons produces its own magnetic field. The direction of the electron flow and the direction of the magnetic lines it produces are at right angles. (See Figure 13)

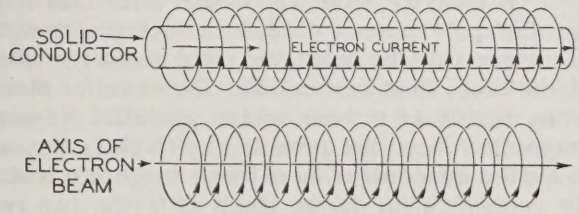

Fig. 13. Similarity of Solid Conductor and Electron Beam

Should this current-carrying conductor be placed in an existing magnetic field with the conductor parallel to the lines of force of this field, no force will be exerted on the electron stream. The magnetic lines from the two sources are at right angles, neither aiding nor opposing one another; therefore, no interaction will result. (See Figure 14)

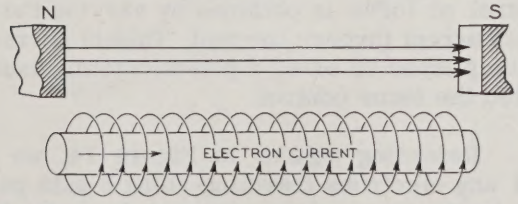

Fig. 14. Conductor Parallel to Magnetic Field

However, should the conductor be laid at right angles to the existing field, a torque or distortion of the magnetic lines will tend to move the conductor from the field, since the lines of the two fields are opposing on one side of the current-carrying conductor or stream of electrons, and aiding on the other side. (See Figure 15)

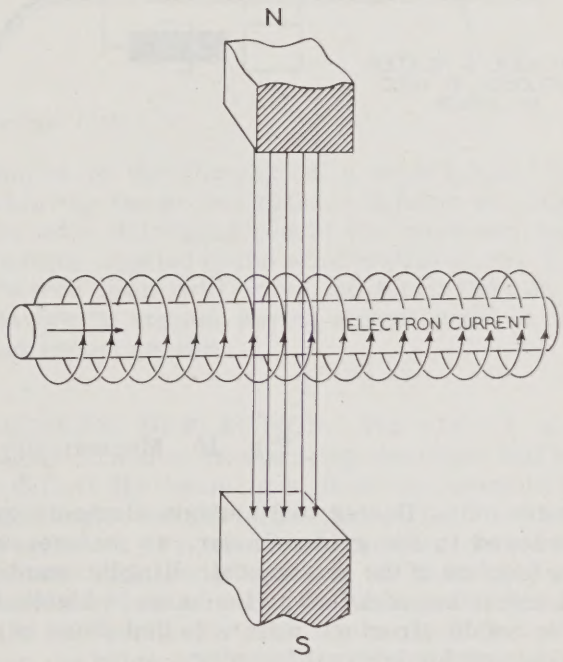

Fig. 15. Conductor at Right Angles to Magnetic Field

It should also be noted that while Figure 15, for the purposes of illustration, shows the electron stream or conductor at a full right angle with respect to the external magnetic field, that an electron stream entering the magnetic field at any angular variation from the parallel condition of Figure 14 will be affected by the external magnetic field to an extent proportionate to the amount of such angular variations.

To apply the foregoing in terms of electromagnetic control of the cathode-ray tube, consider first the construction of this tube (shown in Figure 16) as compared to the electrostatically controlled type. The electron gun assembly is quite similar to that of the electro-

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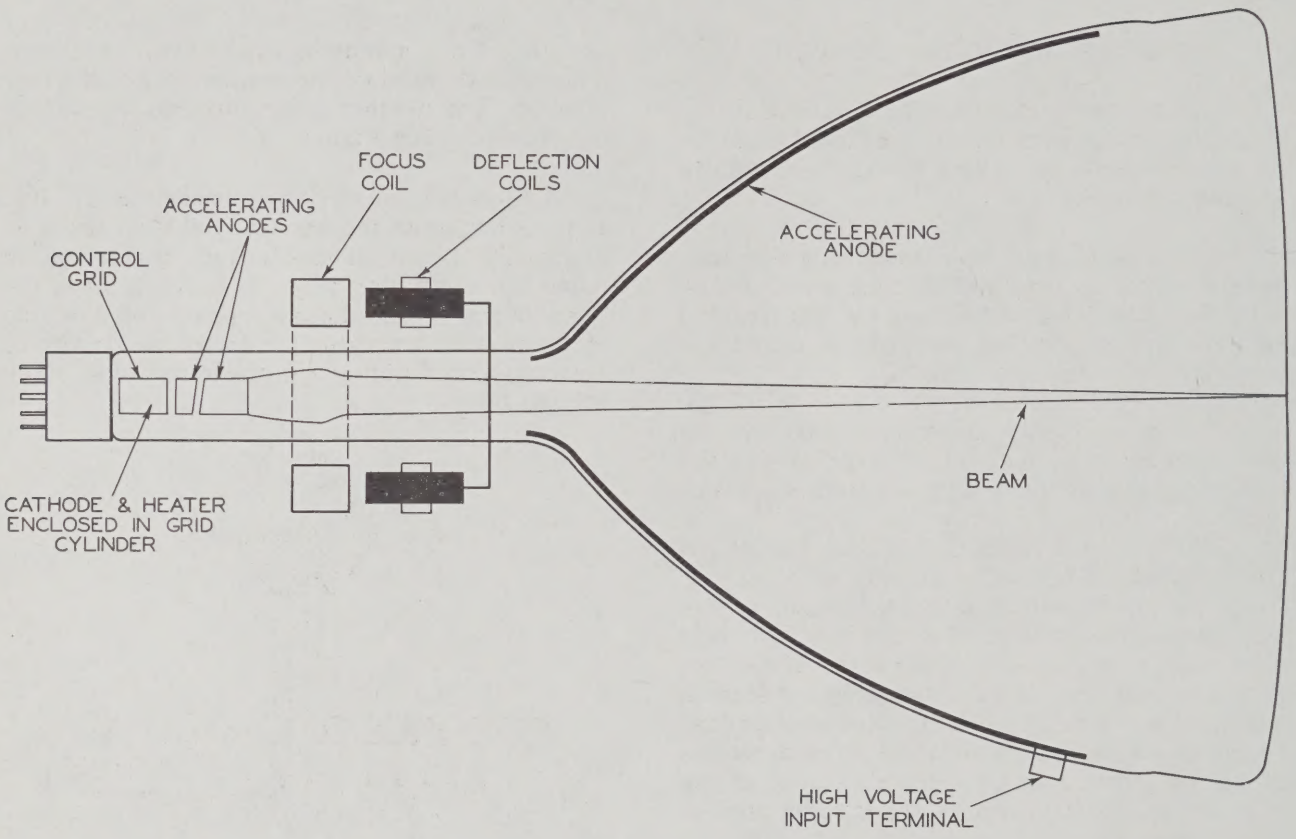


Fig. 16. Magnetically Controlled Cathode-Ray Tube

static unit. Heater and cathode elements are enclosed in the grid cylinder, as before, and the function of the grid in controlling the number of electrons admitted to the beam is identical. The anode structure differs in that there is no provision for internal focusing.

An accelerating anode is placed immediately following the control grid cylinder with its connection terminating in the tube base. Another cylindrical accelerating anode is often used connected through contact springs to the aquadag coating on the inner surface of the flared section of the tube. This aquadag coating terminates in a button contact placed on the outside of the flared section.

MAGNETIC FOCUSING: It will be noted from Figure 16 that the focus coil is placed along the neck of the tube, and since the magnetic field of the coil controls the size of the electron beam and causes the formation of a narrow spot of light on the tube face, no internal focusing elements are required.

The construction and application of a typical focus coil is shown in Figure 17.

A coil of wire is wound with soft iron annular pole pieces placed in such position as to concentrate the magnetic field about the neck of the tube, thus surrounding the beam of electrons inside the tube with parallel lines of magnetic force. An annular gap is placed so as to aid the concentration of these magnetic lines. By concentrating these lines of force, two results are obtained: First, the direct current through the coil is less for a given field strength than would be necessary with other magnetic structures, and second, stray fields are lessened and, therefore, are less likely to affect the action of the other control elements.

Provision is made in television to move the focus coil along the neck of the tube. After it is in its approximately correct position, fine control of focus is obtained by varying the direct current through the coil. This is normally accomplished by using a potentiometer, usually called the focus control.

Referring again to Figure 14, we see that any electrons traveling along a path parallel to the lines of an external magnetic field will not be affected by that field and will con-

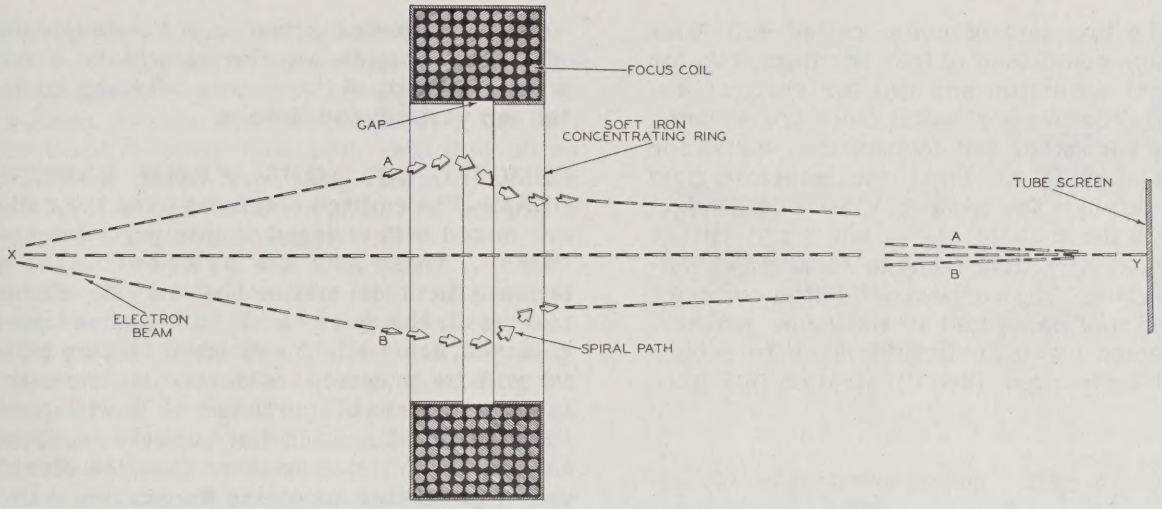
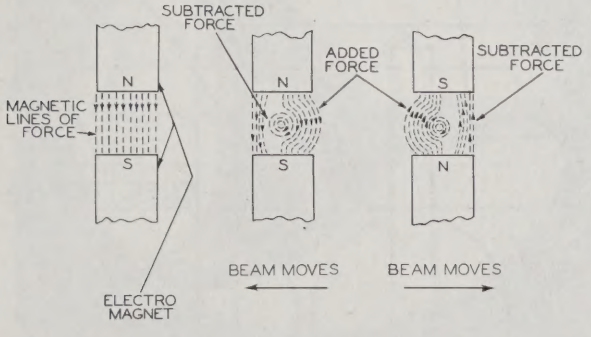


Fig. 17. Action of Focus Coil

tinue to travel in a straight line. Axis XY of Figure 17 shows this path.

Referring to Figure 15, we see that a stream of electrons entering an external magnetic field at right angles will be deflected or forced out of the field. Any time this stream of electrons enters the field at an angle away from the parallel condition, some deflection or sidewise movement of the beam will take place. Lines A and B of Figure 17 represent the paths of electrons which are not parallel to axis XY, and, therefore, since this beam is entering the magnetic field of the focus coil at an angle, a push or sidewise motion of the stream will result. Since the electrons are all traveling at a high velocity, each electron having its own magnetic field, the resulting action of the beam within the focus field will be to take a path similar to the thread of a wood screw. By achieving the proper balance of beam velocity, magnetic field produced by the focus coil, and potential applied to the accelerating anode, the electron beam will leave the focus field in a converging stream having a focal point at the fluorescent screen.

MAGNETIC DEFLECTION: The effect of a magnetic field on fast-moving electrons will be to deflect the beam in a direction which is at right angles to the direction of the field and direction of the electronic motion; therefore, electromagnetic deflection of the beam may be secured by two sets of coils arranged horizontally and vertically over the neck of the tube near the bulge of the bulb, and located close to the focus coil. (See Figure 16)



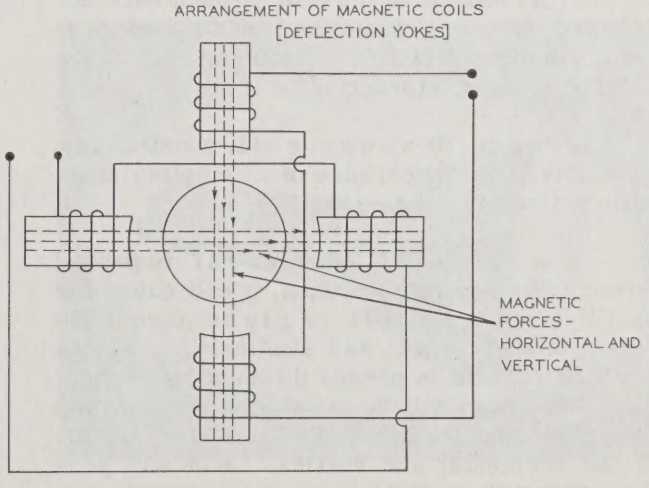


Fig. 18. Action of Deflection Coils

The two sets of coils, called deflection yokes, are comprised of four windings, two for horizontal deflection and two for vertical deflection. The two horizontal coils are mounted opposite each other and connected in series for correct polarity, so that the magnetic field passes through the neck of the tube at right angles to the path of the beam and will be oriented on a vertical plane to secure horizontal deflection. The vertical deflection coils are arranged and connected in the same manner, but oriented on a horizontal plane to secure vertical deflection. (See illustration in Figure 18)

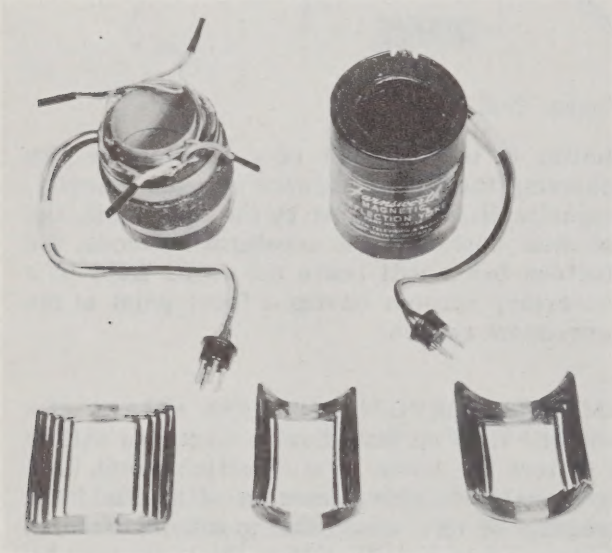


Fig. 19. Deflection coil Assembly (Sample Courtesy of Senn Corporation)

Thus the spot produced by the beam may be moved to any part of the screen by passing the correct amount of current through each set of coils. It is necessary to provide good magnetic shielding between the focus and deflection coils to prevent interaction.

Figure 19 shows coil construction, assembly, and appearance of a complete magnetic deflection yoke.

If a sawtooth of current is passed through the horizontal yokes, it will cause the spot to move from left to right across the screen and fly back; and similarly, if a sawtooth of current is passed through the vertical yoke, the beam will be made to move from top to bottom and fly back. The combined action of the horizontal and vertical fields will produce a frame of light, or raster, similar to that in electrostatic deflection.

A complete discussion of the development of these sawtooth waveforms will be given in a later section of the course covering horizontal and vertical oscillators.

REMOVAL OF IONS FROM ELECTRON BEAM: The emitted electrons from the cathode are mixed with charged atomic particles called "ions". These ions are present in the tube because first, no matter how well the elements making up the internal tube structure are cleansed, some slight amount of foreign material will be present, and second, as the cathode is heated, small particles of it will tend to "break loose". Each ion particle is approximately 2000 times heavier than the electron, and if permitted to strike the screen, a brown spot will gradually appear since the ions will actually remove the phosphor as they strike. The net result is a spot on the screen where no picture material can be produced, causing a poor viewing condition.

Electrostatically deflected tubes are not affected by the presence of ions since the electron beam and the ions are deflected simultaneously by an electrostatic field. However, magnetic fields do not materially affect an ion, and tubes using magnetic deflection systems must have some provision for preventing the ions from reaching the phosphor coating on the face of the tubes; otherwise, the spot will result.

Two methods are currently used for beam purification when the electromagnetic tube is used. The first method takes advantage of the fact that ions are not affected by magnetism.

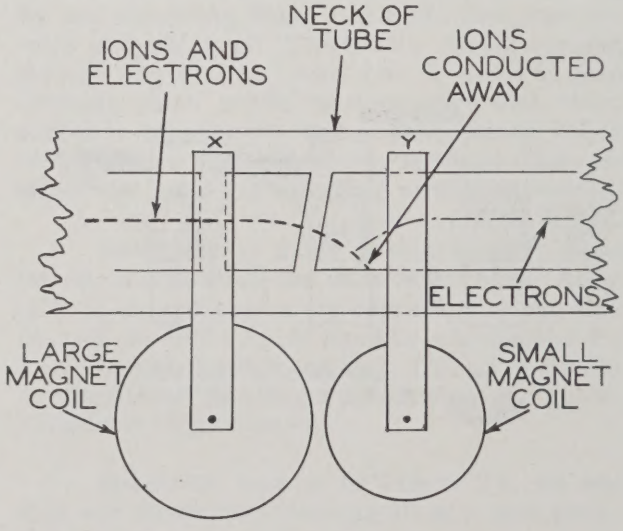


Fig. 20. Action of Ion Trap

The entire beam, containing both ions and electrons, is deflected electrostatically within the gun assembly, and an electromagnet is used to straighten the electron beam allowing the ions to continue on their bent path until they hit an accelerating anode, removing them from the beam. (See Figure 20, which represents a typical "ion trap" assembly.)

The field from the ion trap magnets causes the electron beam to be deflected or bent at points X and Y. The ion trap assembly is adjustable to provide a means of bending the beam at these two points. For correct adjustment, the raster is used as an indicator. The entire assembly is adjusted for maximum brilliancy and good horizontal line focus. Thus a stream of electrons only is allowed to emit from the gun structure. These electrons then pass through the neck of the tube, are focused, deflected, and accelerated toward the tube face. "Bent gun" assemblies are also used in addition to the one illustrated in Figure 20. In either type, the theory of operation is the same.

A second widely used method of beam purification involves the use of an extremely thin film of aluminum placed on the "beam side" of the phosphor viewing screen. The thickness of aluminum is chosen so as to allow the electrons to pass through and strike the phosphor. Since the ions have greater mass, they will not penetrate the aluminum but will be stopped and, therefore, not strike the phosphor. The use of the "aluminized" screen is also felt to give other advantages, namely, that of providing better contrast and brilliance on the picture screen. Of course the use of

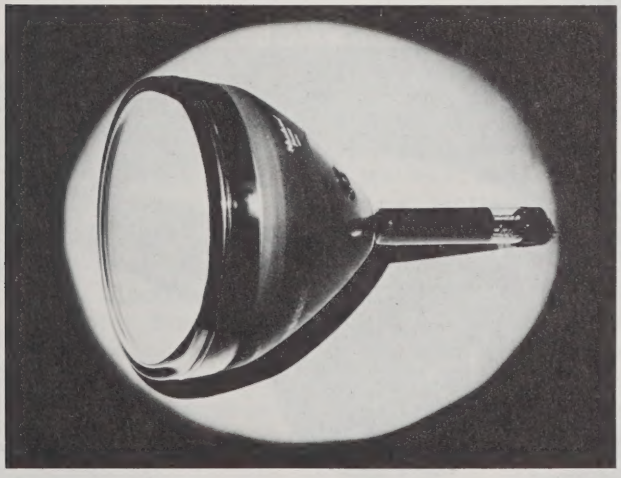


Fig. 21. Type 10FP4 Aluminized Screen Construction (Photo from Sample Courtesy Rauland Corp.)

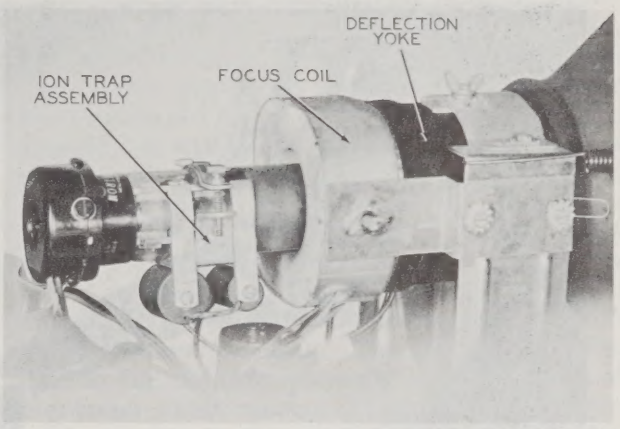


Fig. 22. Electromagnetic Tube Assembly in Receiver

this tube eliminates the need for external coils in the beam purification since the beam does not have to be "bent" within the gun assembly.

Figure 21 shows a tube employing the aluminized screen construction.

Figure 22 illustrates a type 10BP4 magnetically focused and deflected tube with ion trap, focus coil and deflection yoke in position as used in a typical receiver.

Some television receivers employ cathode-ray tubes having electrostatic focus and electromagnetic deflection. Such a tube employing this combination is the RCA type 5TP4 projection unit shown in Figure 23.

The general types of picture tubes and their requirements for deflection have been covered. Before discussing the method of

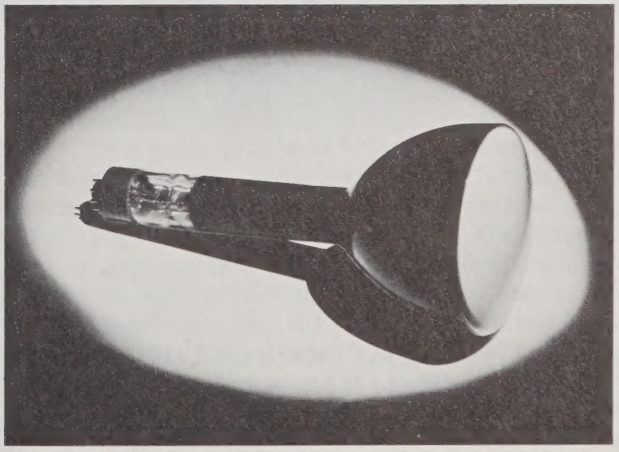
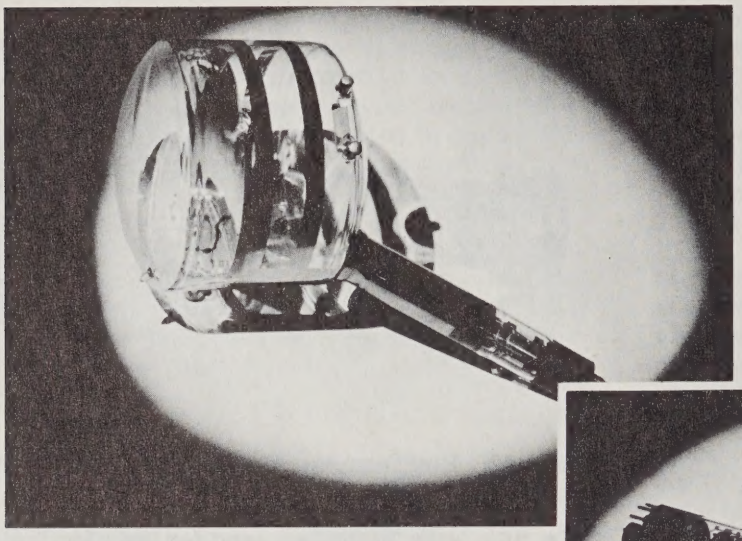
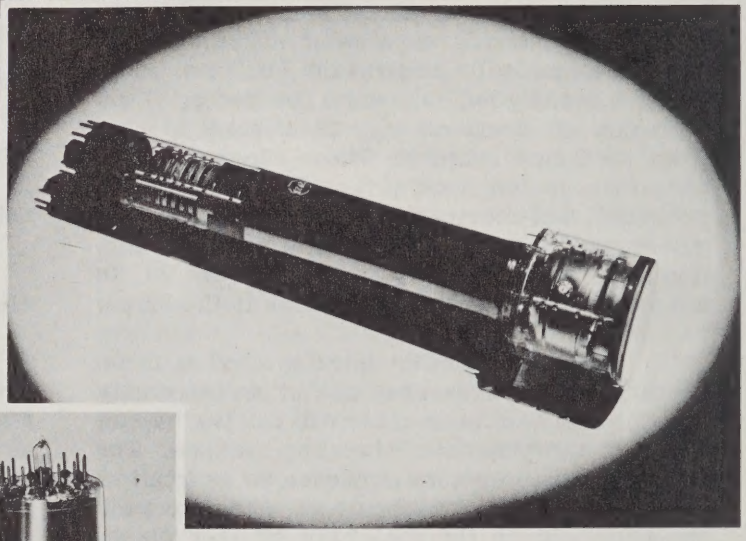


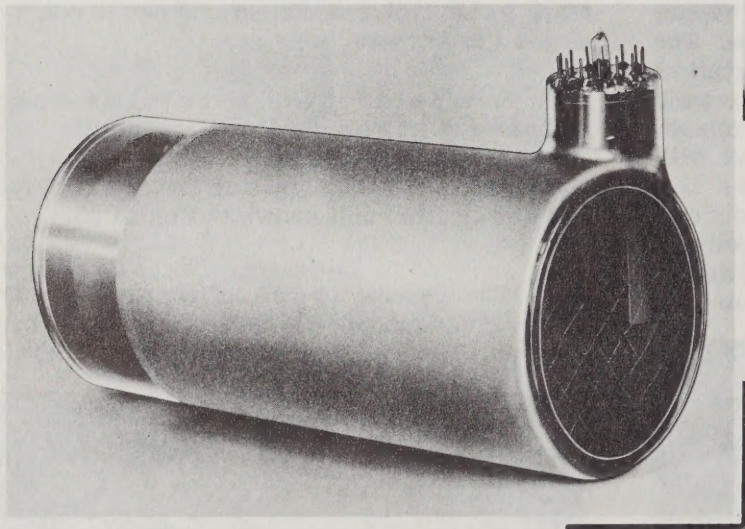
Fig. 23. Type 5TP4 Projection Tube (Sample Courtesy RCA)



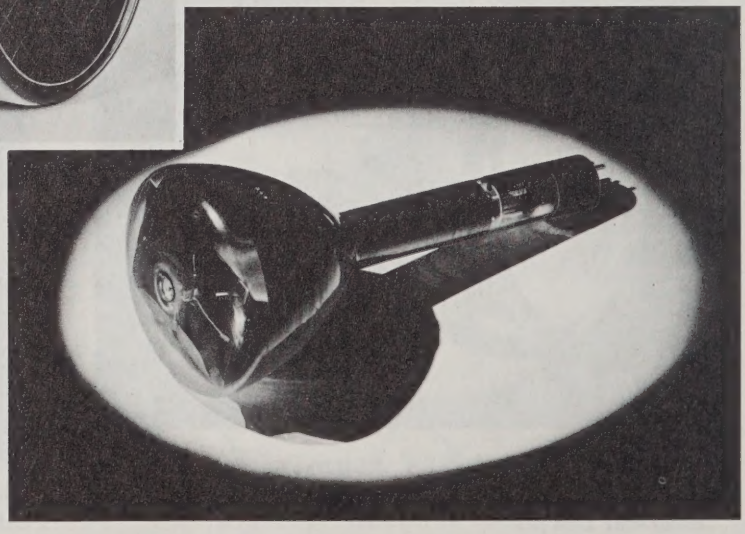
Left: ICONOSCOPE
(Photo from sample courtesy RCA)



Right: IMAGE ORTHICON
(Photo from sample courtesy RCA)



Left: IMAGE DISSECTOR
(Photo courtesy Farnsworth Television & Radio Corp.)



Right: MONOSCOPE
(Photo from sample courtesy RCA)

translating received signals into visual patterns on the face of the picture tube, let us examine the method of converting the televised scene into video signal at the transmitting studio.

THE CAMERA TUBE

There are at present four types of camera tubes: Iconoscope, Image Orthicon, Image Dissector, and Monoscope. A photograph of each type is given on page 18.

A brief discussion of the internal construction and operation of the camera tubes will assist the reader in connecting the scanning technique and transmitted picture to that of the picture tube for reproduction of the transmitted image.

ICONOSCOPE

The Iconoscope is simply a cathode-ray tube, specially designed for translating the scene to be transmitted into electrical impulses. It consists of an electron gun similar to that of the receiving tube, but instead of a fluorescent screen, a large rectangular plate of thin mica is used for a scanning area.

On the front side of this mica sheet are deposited many microscopic particles of caesium silver compound - a photo sensitive material. Each particle or globule is insulated from the other, which gives the mica sheet a mosaic appearance. The back of the mica sheet is covered with a conductive film which is connected to an output lead. The whole arrangement appears as myriads of small condensers or cells, with a common lead through which to discharge their stored energy.

In order to understand the action of the scanning beam, let us assume that no scene is being projected on the mica sheet or mosaic. As the beam strikes the small particles of caesium silver, secondary emission takes place. The number of secondary electrons emitted is several times greater than the primary electrons in the beam which strike the particle. Since more electrons, which are of negative potential, are emitted than the number striking the particle, the potential of the particle will change in a positive direction. It will rise to an "equilibrium potential" of approximately positive three volts. The secondary electrons which have been emitted either go to the collector or to other parts of the mosaic. Since each of the particles is insulated from all others, this "charge" cannot leak off. However, after the beam continues on its sweep, the particle which has been positively charged will attract secondary electrons which have been emitted from other particles in the mosaic. It will then change potential in a negative direction. Due to the abundance of free electrons on the face of the mosaic the particle will actually charge to approximately minus 1-1/2 volts. This action parallels very closely the method of obtaining bias in audio amplifiers known as "contact bias", with which we are familiar. The proximity of the grid to the cathode places it in a cloud of electrons which causes current flow in the grid circuit. In the case of the particle in the mosaic, however, there can be no current flow so the particle takes on a negative charge and maintains it until the beam again strikes it. It can now be seen that each particle changes from negative 1-1/2 volts to a positive three volts each time the beam strikes it.

The output from the Iconoscope is obtained from a resistive load which is connected between the conductive film on the back of the mosaic and ground. A certain capacitance exists between each of the particles and the conductive film. At the instant the beam strikes the particle, the charge on this capacitance cannot change, so the entire voltage will appear across the resistive load. A number of electrons equal to the amount lost by the particle will flow from ground to the conductive film to maintain the charge on the existing capacity. This current flow results in a four and one-half volt potential across the load. Since in the above case no scene has been projected on the mosaic, the potential on each of the particles will change an equal amount. This results in no change in the amount of current flow in the load as the beam scans the mosaic. Since there is no a-c component there is no output from the Iconoscope.

We have discussed the action of the tube with no image projected on the mosaic. In order to understand the action of the tube when illuminated areas are present on the mosaic, let us assume that half of it is illuminated. The caesium silver particles, as stated above, are photo sensitive and will emit electrons when struck with light. When the beam of electrons has passed over a particle which is being struck with light, the particle will attract free electrons. Since some electrons are being emitted due to the photo sensitive properites of the compound, the particle will not take on a

charge of negative one and one-half volts. Instead it will assume some charge in a positive direction from the negative one and one-half volts. The amount, of course, depends upon the amount of light present. For illustration purposes let us assume that the intensity of light present on the illuminated half of the mosaic is such that allows the illuminated particles to charge to a negative one volt. The particles in the non-illuminated area will charge to a negative one and one-half volts, as was the case of the non-illuminated mosaic. As the beam of electrons from the electron gun strike the non-illuminated particles a change of four and one-half volts takes place resulting in a four and one-half volt potential across the load. When the beam strikes the illuminated particles, however, the particle in charging to the "equilibrium potential" of plus three volts, will change only four volts since the original charge was only negative one volt. This results in a potential of four volts across the load giving an a-c component in the output.

When an image is projected on the mosaic each particle will charge to a certain potential depending on the amount of light present. As the scanning beam scans the mosaic horizontally from left to right, and vertically from top to bottom, each particle will be returned to the "equilibrium potential" which causes current pulses to flow in the load resistor. This train of pulses, varying with the charge on the particles, constitutes the video signal.

The output from the Iconoscope is of negative polarity since there is less current flow when an illuminated particle is scanned than when a non-illuminated particle is scanned. Figure 24 shows the major elements of the Iconoscope.

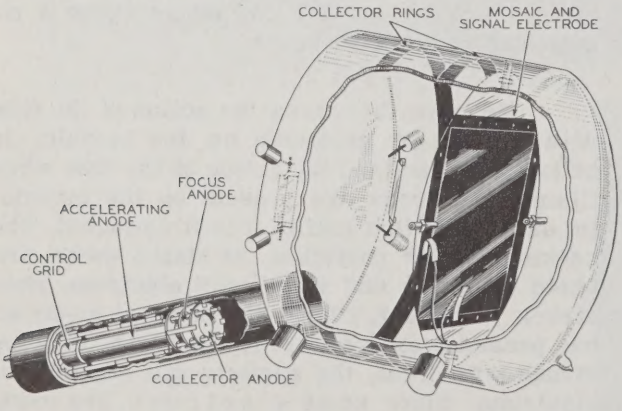


Fig. 24. RCA Type 1850A Iconoscope (Drawing from Sample Courtesy RCA)

IMAGE ORTHICON

This tube is a more recent development than the Iconoscope and will function over a wide range of light values. It is ideal for outdoor pickups and other installations where the light available is not under the control of the pickup crew. For a better understanding of the operation of the Image Orthicon, refer to Figure 25 while studying the following paragraphs.

Light from the scene being televised is focused on the photo-cathode which is semi-transparent. This photo-cathode emits electrons proportional to the amount of light striking the area. These electrons are accelerated toward the target by grid No. 6 and are focused by the magnetic field produced by an external coil. The target consists of a special thin glass disc with a fine mesh screen on the photo-cathode side. Focusing is also accomplished by varying the potential of the photo-cathode.

When the electrons strike the target, secondary emission from the glass takes place. These secondary electrons are collected by the wire mesh, which is maintained at a constant potential of approximately one volt. This limits the potential of the glass disc and accounts for its stability in varying intensities of light. As electrons are emitted from the photo-cathode side of the glass disc, positive charges are built up on the other side of the disc which vary with the amount of electrons which were emitted. Thus it can be seen that a pattern of positive charges are set up which correspond to the intensities of light of the scene which is being televised. This constitutes the image section of the Image Orthicon and the action described is completely independent of the electron beam and the scanning circuits of the tube.

The back side of the target is scanned with a low velocity beam from the electron gun. The beam is focused by the magnetic field generated by an external coil and by the electrostatic field of Grid No. 4. The potential applied to Grid No. 5 adjusts the decelerating field between Grid No. 4 and the target. As the low velocity beam strikes the target it is turned back and focused on dynode No. 1, which is the first element of an electron multiplier. As the beam is turned back from the target, however, some electrons are taken from the beam to neutralize the charge on the glass. The greater the charge on the glass, the more electrons are taken from the beam. Thus, when the beam

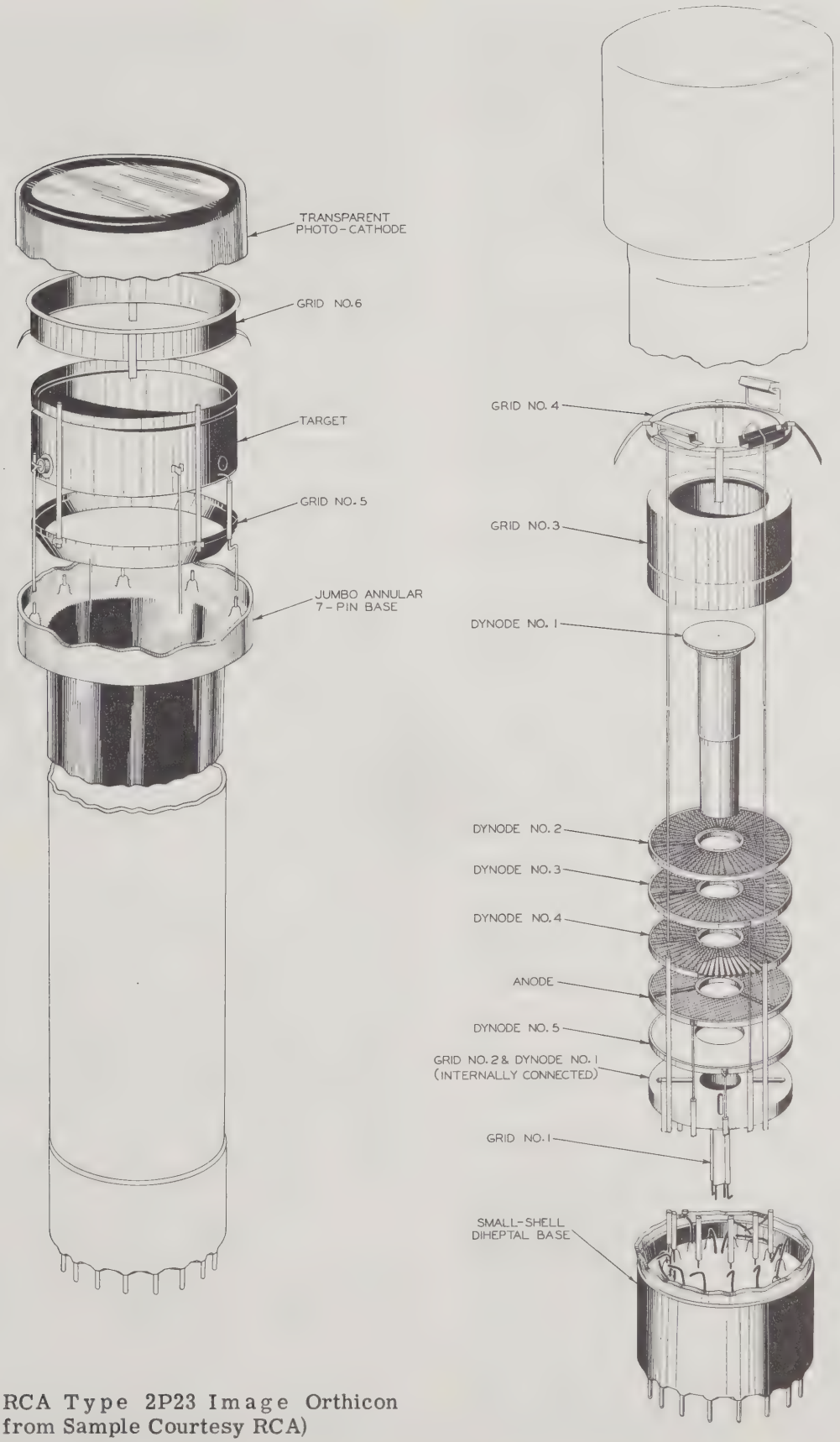


Fig. 25. RCA Type 2P23 Image Orthicon
(Drawings from Sample Courtesy RCA)

scans a more positively charged area, which corresponds to a brighter area in light intensity, fewer electrons are returned to dynode No. 1. This action leaves the scanned side of the target negatively charged while the opposite side is positively charged. Due to the extreme thinness of the glass disc target, however, these charges will neutralize themselves by conduction through the glass. This neutralization takes place in less than the time of one frame.

As the amplitude modulated stream of electrons strike dynode No. 1, secondary electrons are emitted. The number emitted is proportional to the number striking it. Several secondary electrons are emitted for each primary electron striking the element. These free electrons are then accelerated toward dynode No. 2 where, upon striking the element, more secondary emission takes place. This same process continues on through dynode No. 3, dynode No. 4, dynode No. 5 and the electrons are finally collected by the anode or plate. Thus it can be seen that the electrons returned to dynode No. 1 are amplified or multiplied many times before the signal reaches the anode. The amount of multiplication per element is equal to the difference of secondary electrons emitted and the electrons striking the element. The approximate gain of the multiplier section of this tube is 500. The load resistor of the Image Orthicon is connected from the anode to the power supply. More current flow in the multiplier, which corresponds to a dark area in the televised scene, causes more current flow in the load giving a negative output. A brighter area causes less current flow giving a positive output. Thus it can be seen that the output of the Image Orthicon is of positive polarity.

Figure 25 is an exploded view of the internal construction of the Image Orthicon.

IMAGE DISSECTOR

Both camera tubes previously discussed are known as the "storage" type since their operation depends upon the neutralization of positive charges by the scanning beam. The Image Dissector, on the other hand, employs instantaneous scanning.

The tube consists of an evacuated glass cylinder which is closed at both ends. The elements within the tube are the photo-sensitive cathode, an anode, a shielded target having a small aperture and an electron multiplier. The cathode, upon which a caesium-silver oxide film has been formed, is placed at one end of the cylinder. The anode, whose purpose is to accelerate the electrons emitted from the photo-cathode, is a conductive coating on the inner surface of the cylinder. The target is placed near the other end of the cylinder, which is a plane glass end. The target is at the end of an electron multiplier which is used for amplification. In front of the target is a small aperture which will allow only a small portion of the electron image to fall on the target.

The entire cylinder is placed within a focusing coil which produces an axial magnetic field throughout the entire length of the cylinder. The horizontal and vertical deflection coils are also placed around the cylinder, and act also as a supporting framework.

In operation the scene to be televised is focused on the photo-cathode. Electrons are emitted from this cathode according to the amount of light striking that particular area. It can be said that an "electron image" is emitted from the cathode which corresponds to the optical image projected on the cathode. This "electron image" is then accelerated toward the target by the anode which has a positive potential of several hundred volts. The image is maintained in focus by the axial magnetic field of the focusing coil.

The "electron image" is deflected horizontally and vertically by the magnetic field set up by the sawtooth current flow in the deflection coils. As the "electron image" is deflected past the aperture, only a small portion of the image can strike the target. The image, however, is swept past the aperture in a series of 525 interlaced lines thirty times per second. Instead of a beam scanning the

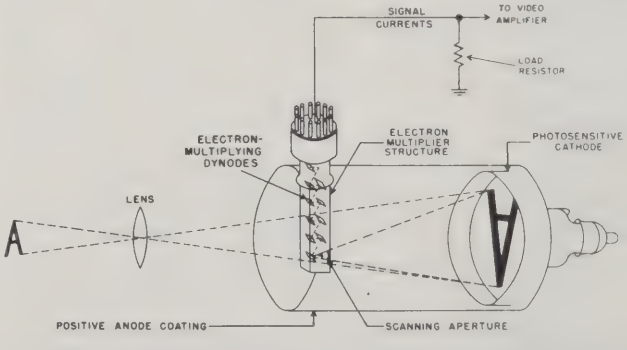


Fig. 26. Image Dissector Operation (Courtesy Farnsworth Television and Radio Corp.)

image, the entire image is scanned past the aperture which "dissects" the image. Thus the name, Image Dissector.

As the image is moved in front of the aperture a varying amount of electrons strike the target. The amount is dependent on the amount of light present in that particular area of the televised scene. As these electrons strike the target, secondary electrons are emitted which are drawn to the next element of the electron multiplier. Each element in the multiplier is maintained at a potential approximately 100 volts positive with respect to the preceding element. The electron multiplying action is similar to that which took place in the Image Orthicon. However, in the Image Dissector eleven stages are used to multiply the photo-cathode emitted electrons.

The amount of resolution obtainable from the Image Dissector is dependent on the size of the aperture in front of the target and to the ratio of the "electron image" to the optical image. As the aperture is made smaller the resolution increases, as is the case when the "electron image" is made larger. An aperture .012"x.012" gives a good signal-to-noise ratio for 525-line resolution. This size aperture is used in present day construction of Image Dissectors.

Figure 26 illustrates the operation of the Image Dissector.

MONOSCOPE

Another cathode-ray tube used in transmission of the television signals is the Monoscope, shown in Figure 27.

It is used for testing and adjusting studio equipment and when its signal is transmitted by the station, it is useful for the proper adjustment of the receiving equipment. The primary difference of this tube from the other camera tubes discussed previously is the inclusion of a test pattern which is placed in the front of the tube envelope. This test pattern is then reproduced as the video signal.

The difference in amount of secondary emission of electrons between two materials is used to produce the output. Usually a sheet of aluminum, which has high emission, is marked with high carbon content ink. Carbon has fairly low emission and as the electron beam scans the entire pattern, secondary electrons are emitted from both materials in proportion to their emission ratios. Any pattern with any line shape may be drawn on the aluminum sheet.

The Monoscope is a stable video signal source and, therefore, provides both the television engineer and the service technician with a useful tool.

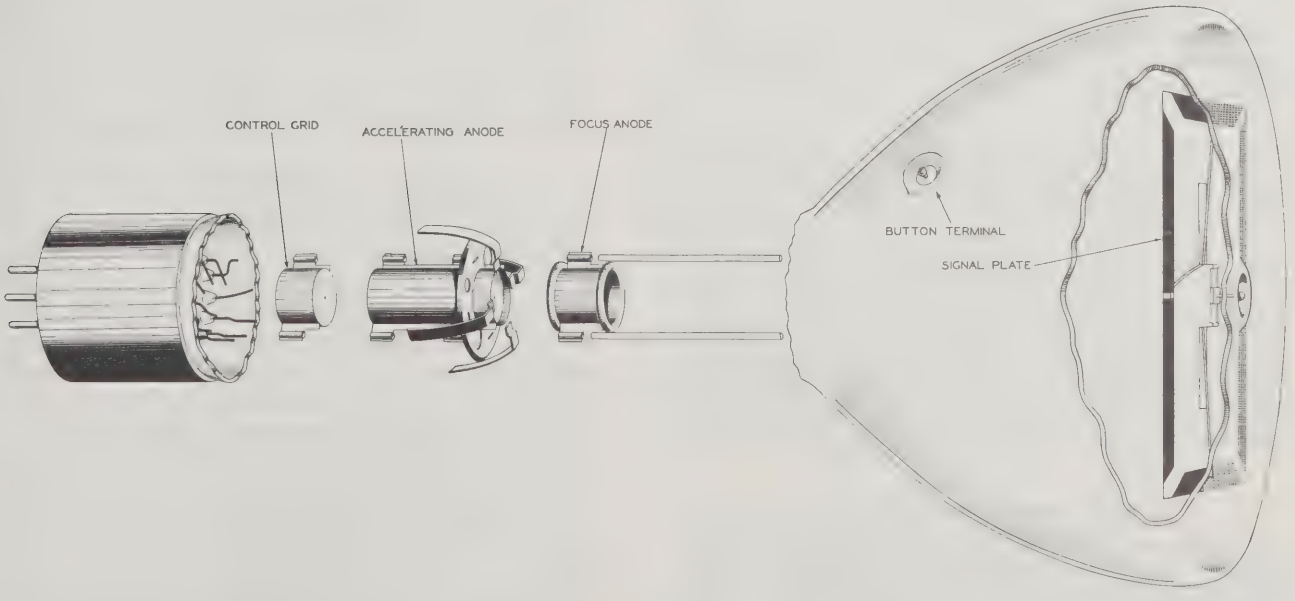


Fig. 27. RCA Type 2F21 Monoscope (Drawing from Sample Courtesy RCA)

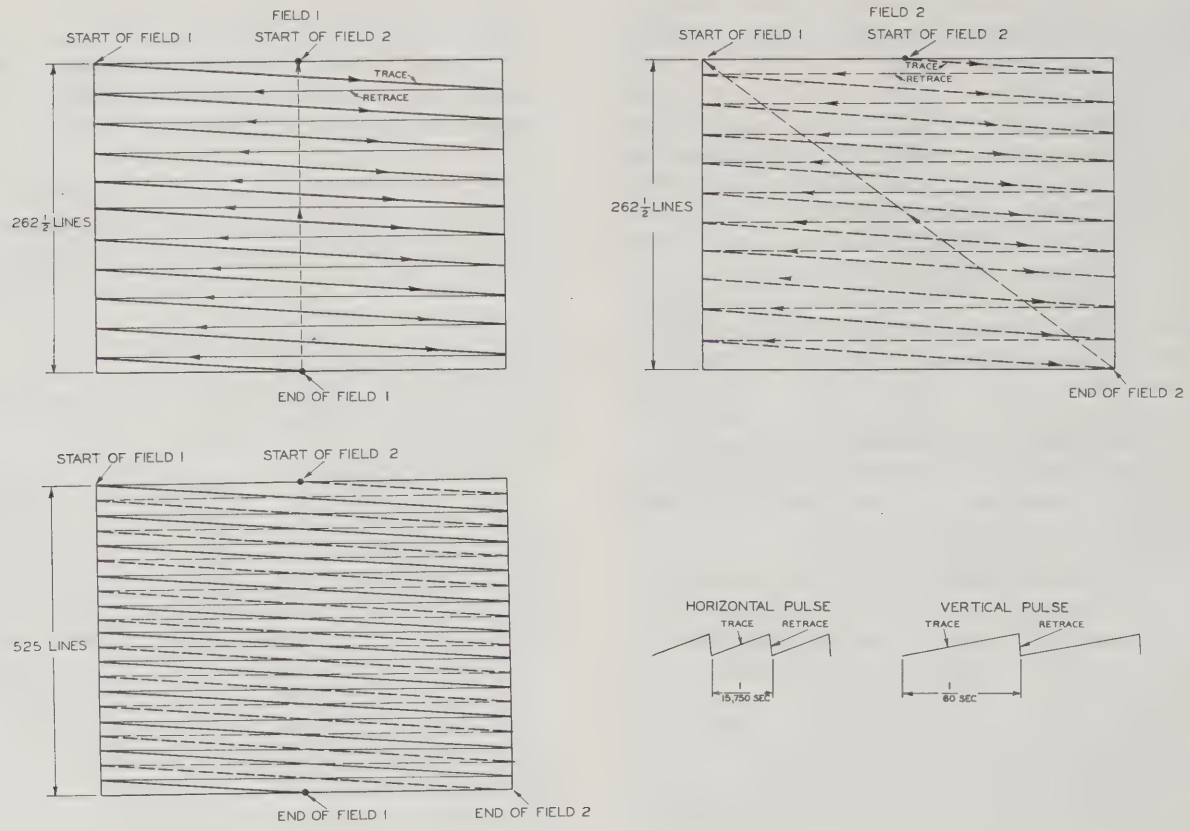


Fig. 28. Interlaced Scanning

SCANNING

All of the picture generating tubes discussed have associated external focus and deflection elements which cause the electron beam to scan the active picture surface at the front of the tube.

The video signal carries the picture information to be transmitted over the air. Since the timing of the scanning process is very important, the video signal must contain other information in the form of electrical impulses. These impulses are termed blanking pulses, which blank out the return trace of the cathode-ray beam in the camera tube during fly-back time, and synchronizing pulses, which are utilized by the receiver to synchronize the horizontal and vertical sawtooth generators.

The path travelled by the beam across the screen of the picture tube should be identical to the path travelled by the beam in the camera tube so that the picture may be reconstructed in the correct sequence at the receiver.

For picture resolution, the present standards for television broadcasts are 30 frames per second, each frame being constructed of 525 horizontal lines, using interlaced scanning. (If alternate lines be transmitted in such a way that two series of lines are necessary to produce a complete frame, the system is called interlacing.)

Therefore, to produce one frame of 525 lines interlaced, 262-1/2 horizontal lines are scanned on the first down sweep of vertical deflection, and the beam returns to the top and scans 262-1/2 alternate lines. The horizontal and vertical scanning traces are the result of passing current having a sawtooth form through the respective deflection coils. The rapid return of the electron beam, or retrace, for the start of the succeeding scanning function, is a result of the rapidly decreasing current in this sawtooth form. In order to produce interlaced scanning with 525 lines and 30 complete frames per second, the vertical sweep frequency must be 60 cycles per second, and the horizontal sweep frequency must be 15,750 cycles per second. Figure 28 further explains the complete scanning operation.

Installment No. 3 will treat television power supplies and RC (Resistance-Capacitance) time constants.

The PHOTOFACT Servicer

MAY 1, 1948 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ VOL. 4, No. 39

ROBERT M. ELLIS, *Editor*

ENTHUSIASTIC RECEPTION

The enthusiasm of the radio service fraternity for the new PHOTOFACT Television Course seems unbounded. Service technicians, dealers, distributors, their salesmen and countermen have told us, "Your Television Course is just what we wanted."

Our own enthusiasm is running high, too. Your editor has had the opportunity of reading advance copy of future lessons. Frankly, we know of no one who can even approach Mr. A. C. W. Saunders for his ability to describe electronic phenomenon in simple, easy to understand language.

Incidentally, Mr. A. C. W. Saunders, the author of the PHOTOFACT Television Course, needs no introduction to thousands of radio service technicians in the New England and Rochester area, because he has fathered the Radio Technician Guild movement since its inception; and he has been a favorite speaker at many service conventions.

When the news that the Saunders Course would be included in PHOTOFACT Folders reached New England we received the following unsolicited telegrams:

"Saturday, March 20, 1948
Regarding television series it is the best news yet.
S. C. LAZENBY, R.G.
Reading, Mass."

★

"Saturday, March 20, 1948
We are looking forward to your Television Program for the Radio Service Man with confidence.
E. L. MURPHY
Amsberry, Mass."

★

"Monday, March 22, 1948
Your proposed Television Course for Radio Servicemen is certainly a morale booster.
JIM SHEPLEY, *Secretary*
Whaling City Chapter
New Bedford R. T. G."

★

"Wednesday, March 24, 1948
Looking forward to your television courses. Excellent idea. We know they will be good.
Lynn R. T. G.
WATSON WIECZOREK
110 River Street, Lynn, Mass."

★

"Thursday, March 18, 1948
Received splendid news regarding your coming Television Program. Your selection excellent.
TELEVISION CENTER OF NEW ENGLAND
Boston, Mass."

★

"Wednesday, March 17, 1948
Regarding your coming Television Program, we are honored and happy.
BERTRAM L. LEWIS, R.T.G.
Rochester, New York."

★

"Friday, March 19, 1948
Your choice in Television instruction is considered excellent by us on Cape Cod.
ARTHUR C. HOLTON, R.T.G.
Hyannis, Mass."

"Friday, March 19, 1948
Congratulations on your proposed Television Course for Radio Technicians. We heartily endorse the theory.
RADIO TECHNICIANS GUILD
Al Turner, Secretary."

★

Here is the opinion of responsible technicians who know A. C. W. Saunders and who are familiar with his work. If you have any question as to the value of the PHOTOFACT Course, you can ask these men—respected leaders of the service profession—and they will tell you that the PHOTOFACT Course is indispensable—the most important service literature ever given the service technician.

Don't pass up this chance of a lifetime. Get every issue of PHOTOFACT Folders. Carefully study each lesson as it appears. You *can* service television receivers with the same ease and confidence you have in tackling customary sets—and the Saunders Course will show you how to do it.

★ ★

FIELD EXPERIENCES

Here is your opportunity for passing practical service experiences to others for the benefit of all. For every service "Field Experience" published, we issue to the author a certificate that is good for one PHOTOFACT Folder Set. Since it is impossible to verify the accuracy of contributions, we cannot be responsible for either the diagnosis made of the receiver trouble, or the results which will be obtained by following the suggested repair routine. All contributions become the property of Howard W. Sams & Company, Inc.

★ ★

GENERAL INSTRUMENT RECORD PLAYER 205
Photofact Set 10

"I have had two of these record players with the same fault.

"After the needle hit the record it would trip and the arm would come up and shake and shatter. Upon pressing the reject button the changer would make its cycle and come back and repeat the same thing over again.

"I found the trouble to be in the trip lever (Item 55). The photographs do not show it, but there is a square stop riveted to Item 55 parallel with Item 56 (trip point adjustment screw). This square stop becomes loose and lets the cam assembly Item 76 slip past its regular stopping point.

"In both cases I re-riveted the stop and soldered it in its correct position which cleared up the trouble.

"On Page 3 of the PHOTOFACT you can faintly see the square stop just above the arrow point on Item 56.

"For your information these record players were used in General Electric Model 304, Folder 482-10, Set 32 and General Electric Model 355, Folder 483-9, Set 33."

Submitted by: Mr. Arnold Smith, Monon, Indiana

★ ★

WESTINGHOUSE PORTABLE H 148
Photofact 475-37, Set 15

"Complaint: Distortion and cutting off.

"The trouble was caused by the filament resistor, PHOTOFACT Item 25, Part No. V3869, increasing in value. We replaced the part with 10 watt 2,000 ohm resistors on several of these models."

Submitted by: Mr. J. M. Gooch, Serviceman, Reliance Electric and Radio Co., 210 Whitaker Street, Savannah, Georgia

STEWART-WARNER 51T146
Photofact 475-35, Set 15

"One of the complaints received on these models has been erratic performance as evidenced in an intermittent drop in the overall sensitivity, resulting in an inability to receive any but locals, and these at low volume. This trouble has been found to be caused by an increase in resistance of the soldered terminals inside the shield can connecting to the secondary winding of the first i.f. transformer. Remove the can and resolder the connections, or replace the entire transformer.

"Also check the output tube plate by-pass condenser and the coupling condenser for high resistance, leakage or intermittent action: these are subjected to heat, resulting in occasional breakdowns."

★

CROSLEY 146CS
Photofact 4715-10, Set 25

"Noise resulting when the 6SG7 r.f. tube is tapped, and which is not due to a noisy tube, is usually caused by the 1,000 mmf. screen by-pass condenser (Part 57). Replace with a ceramic type condenser of the proper value, and then check the alignment of this stage for misalignment. The alignment of this stage is critical and is easily altered by any electrical or mechanical changes that might have occurred in the positioning of the leads from differences in physical dimensions, or from differing electrical characteristics of the replacement condenser."

★

AUTOMATIC 640
Photofact 4610-4, Set 10

"A loud hum in these models that is not caused by defective filters, and which cannot be controlled in intensity by the volume control has been found in a number of cases to be caused by an excessively long lead used to ground the volume control. This in effect places the low terminal of the volume control slightly above ground in potential resulting in hum. Also turn the control to minimum volume position with switch still 'on,' and measure the resistance between center terminal and ground (chassis). If the reading is more than 25-50 ohms, replace the control.

"Increasing the size of the filter resistor (Part 25) to one of 2,000 ohms at 2 watts will also decrease the hum appreciably, with practically no decrease in performance. This resistor has been found to shift in value as much as 50% in some sets, and when the shift is towards a decrease in resistance, the efficiency of the filter network is lowered, with an increase in audible hum."

Submitted by: Mr. Arthur L. Johnson, Johnson Radio Laboratory, 516 North Main, Hutchinson, Kansas

★ ★

SILVERTONE MODELS 7165 AND 7166
Photofact 4610-29, Set 10

"Complaint: Low volume even on strong local stations.

"On these sets, I have saved time by first checking the loop antenna with an ohmmeter. If I find an open circuit in the loop, I then connect another antenna to the variable condenser where the loop is connected. If set then plays with normal volume, replace the loop or repair the broken leads."

Submitted by: Mr. Clare E. Ernst
4918 Laurene Street, Flint 5, Michigan

★ ★

PHILCO 48-200
Photofact 483-19, Set 33

"This model sometimes develops considerable distortion when in operation five minutes or longer. A voltage check of the power tube will show a positive grid—as high as 9 volts—even though the .01 mfd. coupling capacitor checks o.k.

"The remedy for this distortion is a new 35A5. I have found the trouble in four sets of this model."

Submitted by: Mr. Earl E. Brehmer
2145 N. W. 47th St., Miami 37, Florida

★ ★

FORD-MERCURY 7070
Photofact Pending

"The set was intermittent in operation.

"Voltage check revealed 150 volts on the plate of the 7B6 tube, where the service manual specified 87 volts. When the 7C5 was removed from the socket, the disturbing action cleared the short in the first audio tube and set operated normally. If set was allowed to remain off over night same thing happened over again. The 7B6 tube would not check shorted unless it was absolutely cold when placed in the tube checker.

"A new 7B6 tube was installed and no further trouble was experienced."

Submitted by: Mr. Paul Segars, Radio Service Department, Scarritt Motors, 141 Second Avenue, S., St. Petersburg, Florida

★ ★

HOWARD 909M
Photofact 4715-15, Set 25

"In a Howard Model 909M, the complaint was an intermittent roar or hum.

"We found the trouble was caused by a loose rivet on the soldering lug that grounds the 25 mfd. condenser, PHOTOFACT Item No. 11, on the volume control."

Submitted by: Mr. Henry E. Henley
Henley Brothers, Pond Creek, Oklahoma

★ ★

PHILCO 46-480
Photofact 479-25, Set 19

"A Philco 46-480 gave us a bit of trouble with loud motorboating. The usual causes were checked but the set proved o.k.

"Finally we found that trimmer 'A1' of the i.f. transformer, PHOTOFACT Item No. 101, was shorting, allowing B-plus to get into the discriminator and a.v.c. circuit. The short was caused by breakdown of the mica between the plates. Replacing this mica and realigning the set put it back in its original condition."

Submitted by: Mr. Abraham Endicter, Endicter Radio Hospital, 4007 Girard Avenue, Philadelphia, Pennsylvania

★ ★

CROSLEY 56TG
Photofact 464-3, Set 4

"The Crosley 56TG has the a.v.c. resistor from the volume control tied to an unused pin on the 35W4. This pin may develop a negative potential up to 15 volts so that only very strong signals can be picked up. The remedy is to either replace the tube or to clip the a.v.c. loose from the rectifier socket prong. The 35W4 will probably check good in a checker."

Submitted by: Mr. V. L. Vice
Griffin Appliance, Bowie, Texas

★ ★

PHILCO 46-200, 48-200
Photofact 461-24, Set 1; 483-19, Set 33

"If the set has poor sensitivity, tunes broadly and if trimmers have little effect, check .05 or .1 200 volts a.v.c. condenser for high leakage or dead short. Also resolder the oscillator coil winding connections."

★

PHILCO 46-350, 48-360
Photofact 4610-24, Set 10, and Pending

"If the set has poor tone and low volume, check the 1U5 for leakage, the 1U5 screen dropping resistor for open, and the screen by-pass condenser for a short."

Submitted by: Mr. J. C. Wunderlich
236 West Brooks, Galesburg, Illinois

PUBLICATION DATES

When will other sets of PHOTOFACT Folders be published?

Volume 4—Set No. 40 ..... **May 15**
Volume 5—Set No. 41 ..... **July 15**
Volume 5—Set No. 42 ..... **July 15**
Volume 5—Set No. 43 ..... **Aug. 15**

If you have been unable to get any issues of PHOTOFACT *Folder Sets, send your order and money directly to us and we will see that you are supplied.*

AIR KING MODEL
4700

AIR KING MODEL
4700

AIR KING MODEL 4700

TRADE NAME	Air King, Model 4700
MANUFACTURER	Air King Products Co., 170 53rd St., Brooklyn, N.Y.
TYPE SET	AC Operated Combination Superheterodyne Receiver and Record Player with Wire Recorder (Crescent Model E 1000)
TUBES (SEVEN)	Types, 7Q7 Converter, 7A7 IF Amp., 7B6 Det.-AVC-AF, 7C5 Power Output, 1273 Pre-Amp., 7C5 Bias Osc., 7Z4 Rectifier.
POWER SUPPLY	110-120 Volts AC
TUNING RANGE—BROADCAST	540-1670KC RATING .461 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

There are five calibration marks on dial backplate. Reading from left to right they are: end limit, 600KC, 1000KC, 1500KC & 1670KC. Turn tuning cap. fully closed and set pointer to end limit mark.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to rear stator of tuning cap. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output.
2	200MMFD	High side to ext. ant. lead. Low side to chassis.	1500KC	1500KC	"	A5	" " " "
3	200MMFD	"	1400KC	Tune for maximum output.	"	A6	" " " "

HOWARD W. SAMS & CO., INC. **Indianapolis Indiana**

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		AIR KING PART No.	STANDARD REPLACEMENT		
1	Converter	7Q7	7Q7	6AL	
2	IF Amp.	7A7	7A7	9V	
3	Det.-AVC-AF	7B6	7B6	8w	
4	Power Output	7C5	7C5	6AA	
5	Pre-Amp.	1273	1273		
6	Bias Oscillator	7C5	7C5	6AA	
7	Rectifier	7Z4	7Z4	5AZ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	AIR KING PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
8A	40	300	20114	TAF444JA		DY-311	EL-422	▲ Filter
B	20	300						"
C	20	300		PRS450-20			UT-123	"
D	25	20				M-20-350		Output Cathode Bypass
9	10	450		PRS450-10	BR1045	M-10-450	UT-12	Decoupling
10	.05	400		484-05	DT4S5	ST-4-05	TC-15	Line Filter
11	.002	600		684-002	DT6D2	ST-6-02	TC-22	Output Plate Bypass
12	.005	400		464-005	DT6D5	ST-6-005	TC-25	Tone Compensation
13	.05	400		484-05	DT4S5	ST-4-05	TC-15	Audio Coupling
14	.01	400		484-01	DT4S1	ST-4-01	TC-11	" "
15	.05	600		684-05	DT6S5	ST-6-05	TC-15	RF Bypass Pwr. Supply
16	.05	400		484-05	DT4S5	ST-4-05	TC-15	Screen Bypass
17	.05	600		684-05	DT6S5	ST-6-05	TC-15	AVC Filter
18	.001	400		484-001	DT4D1	ST-4-001	TC-21	Audio Coupling
19	.01	400		484-01	DT4S1	ST-4-01	TC-11	" "
20	.001	400		464-001	DT6D1	ST-4-001	TC-21	Tone Compensation
21	.02	400		484-02	DT4S2	ST-4-02	TC-12	Audio Coupling
22	.002	400		484-002	DT6D2	ST-6-002	TC-22	Tone Compensation
23	.05	400		484-05	DT4S5	ST-4-05	TC-15	Pre.-Amp. Screen Bypass
24	.2	200		484-.2	DT4P2	ST-4-2	TC-2	Pre.-Amp. Coupling
25	.001	400		464-001	DT6D1	ST-6-001	TC-21	Contact Bypass
26	.2	400		484-.2	DT4P2	ST-4-2	TC-2	Bias Osc. Cathode Bypass
27	.015	600		684-015	DT6S15			Fixed Trimmer
28	.01	400		484-01	DT4S1	ST-4-01	TC-11	Bias Osc. Grid Cap.
29	220	500		1468-00025	5W5T25	MO.5-325	1FM-325	AF Plate Bypass
30	100	500		1468-0001	5W5T1	MO.5-31	1FM-31	Diode Filter

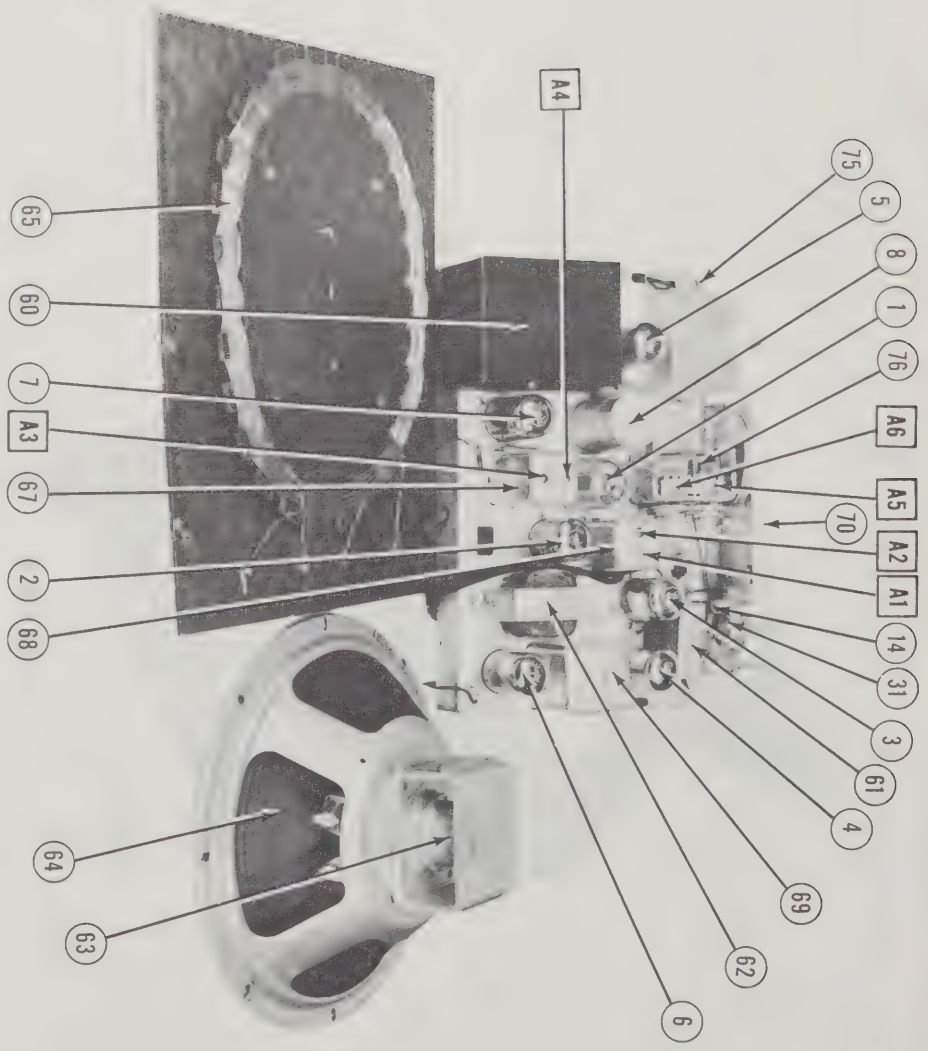
CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	AIR KING PART No.	IRC PART No.	CLAROSTAT PART No.	
31A	2 Meg.	½	2485	D13-139	M-66-Z	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 31A per instructions
32A	500KΩ	½	2486	D11-133	M-56-S	Tone Control
B	Shaft		Not Req.	A	Not Req.	Attach to 32A per instructions
C	Switch		" "	41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	AIR KING PART No.	IRC PART No.	
33	22KΩ	½		BTS-22K	Red-Red-Or. Oscillator Grid
34	15KΩ	2		BT-2-15K	Br.-Grn.-Or. Screen Dropping
35	2.2 Meg.	½		BTS-2.2 Meg.	Red-Red-Grn. AVC Network
36	680KΩ	½		BTS-680K	Blue-Gray-Yl. Diode Load
37	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue AF Grid
38	330KΩ	½		BTS-330K	Or.-Or.-Yl. AF Plate Load
39	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. Output Grid
40	240Ω	½		BW-½-220	Red-Yl.-Br. Output Cathode
41	470Ω	1		BW-1-470	Yl.-Vi.-Br. Filter
42	500KΩ	½		BTS-470K	Grn.-Blk.-Yl. Voltage Dropping

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA AIR KING PART No.	REPLACEMENT DATA IRC PART No.	IDENTIFICATION CODES
[illegible]	1 [illegible]	1		BTS-1.0K	Br.-Blk.-Yl. Tone Compensation
[illegible]	1.0K	1		BW-1-1.0K	Br.-Blk.-Yl. Decoupler Load
[illegible]	1 [illegible]	1		BTS-1.0K	Br.-Blk.-Yl. Series Isolator
[illegible]	1 Meg.	1		BTS-1 Meg.	Br.-Blk.-Grn. Series Phono
47	150KΩ	1		BTS-150K	Br.-Grn.-Yl. Bias Shunt
[illegible]	2.2Ω	½		BW-½-2.2	Red-Yl.-Gold Speaker Balance Network 4 to 1
4[illegible]	1.0Ω	½		BW-½-1	Br.-Blk.-Gold " " "
[illegible]	3.3Ω	1		BW-1-3.3	Or.-Or.-Gold " " "
[illegible]	68K	1		BTS-68K	Blue-Gray-Or. Tone Compensation
[illegible]	470KΩ	1		BTS-470K	Yl.-Vi.-Yl. Mic. Amp. Decoupling
[illegible]	470KΩ	1		BTS-470K	Yl.-Vi.-Yl. Mic. Amp. Plate Load
[illegible]	2.2 Meg.	1		BTS-2.2 Meg.	Red-Red-Grn. Mic. Amp. Screen Dropping
[illegible]	4.7 Meg.	1		BTS-4.7 Meg.	Yl.-Vi.-Grn. Mic. Amp. Grid
[illegible]	100Ω	½		BW-½-100	Br.-Blk.-Br. Bias Osc. Cathode
[illegible]	18KΩ	1		BTS-18K	Br.-Gray-Or. Mic Osc. Grid
[illegible]	330Ω	½		BW-½-330	Or.-Or.-Br. Parasitic Suppressor
[illegible]	18Ω	2		BW-2-18	Br.-Gray-Blk. Surge Limiter

Note 1-Models using 63B use 8.0Ω in this application. IRC Replacement BW-½-8.2.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA AIR KING PART No.	REPLACEMENT DATA STANCOR PART No.	REPLACEMENT DATA THORDARSON PART No.	REPLACEMENT DATA MERIT PART No.
60	117V AC @ .46A	500V CT @ .075A	6.4V AC @ 3.5A		1091		T22R05†	P-29534

†Add series resistor to reduce plate voltage.
‡Drill new mounting holes.

FILTER CHOKE

ITEM NO.	RATINGS TOTAL DIRECT CURRENT	RATINGS D.C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA AIR KING PART NO.	REPLACEMENT DATA STANCOR PART NO.	REPLACEMENT DATA THORDARSON PART NO.	REPLACEMENT DATA MERIT PART No.	INSTALLATION NOTES
61	.03A	460Ω	11 Henries	3368	C-1707*	T20C52*	C-2481	*Drill one new mounting hole.

TRANSFORMER (OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA AIR KING PART No.	REPLACEMENT DATA STANCOR PART No.	REPLACEMENT DATA THORDAR'N PART No.	REPLACEMENT DATA MERIT PART No.	INSTALLATION NOTES
62A	5700Ω	3.6Ω	470Ω	.7Ω	1339	A-3870	T22S58	A-2102*	*Drill one new mounting hole.
B					1341				Used with 63B.

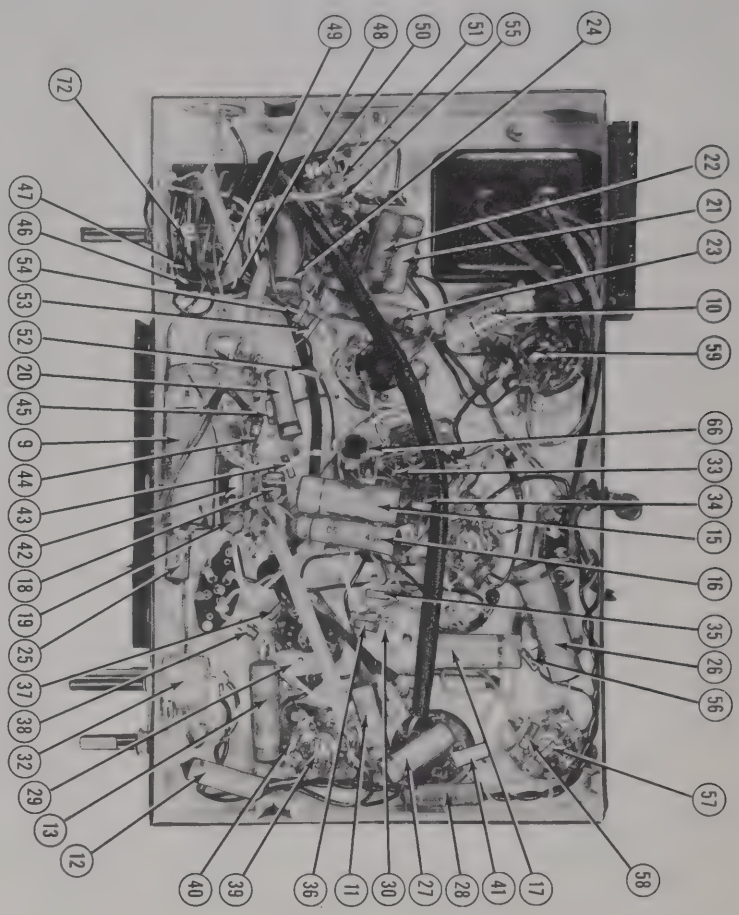
SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA AIR KING PART No.	REPLACEMENT DATA JENSEN PART No.	REPLACEMENT DATA QUAM PART No.	INSTALLATION NOTES
	FIELD RES.	VC IMP.		ST-120‡		
63A	PM	3.6Ω	58103	Mod. P10-S	10A3	‡Replace output transformer to match 6-8Ω voice coil.
B		8Ω				Alternate Speaker
	CONE DIA.	VC DIA.				
64	9½"	1"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA AIR KING PART No.	REPLACEMENT DATA MEISSNER PART No.	
65	Loop Ant.	.1Ω	1.2Ω	28205		
66	Osc. Coil		9Ω	28184	14-1060§	§Add 50MMFD from osc. grid to high side tuning cap.
67	Input IF	22Ω	22Ω	3371	16-6658	
68	Output IF	31Ω	31Ω	3535	16-6660	
69	Bias Osc.	.1Ω	3Ω	28173		

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

DIAL LIGHT

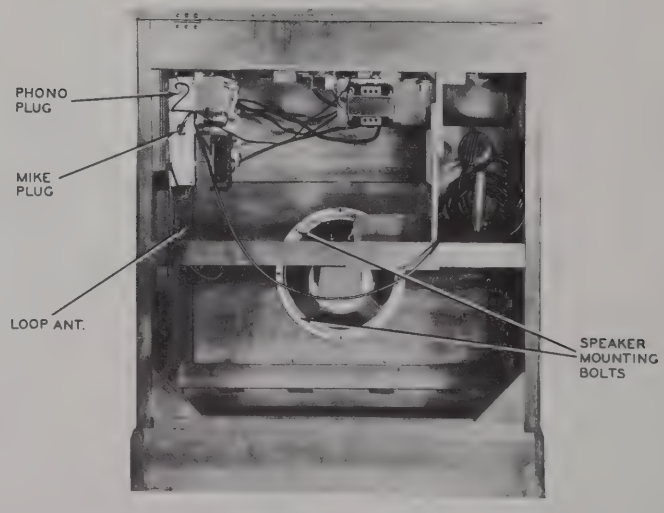
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA AIR KING PART No.	REPLACEMENT DATA	INSTALLATION NOTES
70	Bayonet	6-8	0.15	Brown			Type 47

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA AIR KING PART No.	REPLACEMENT DATA ASTATIC PART No.	REMARKS
71		L-70-A	L-70 Original Part

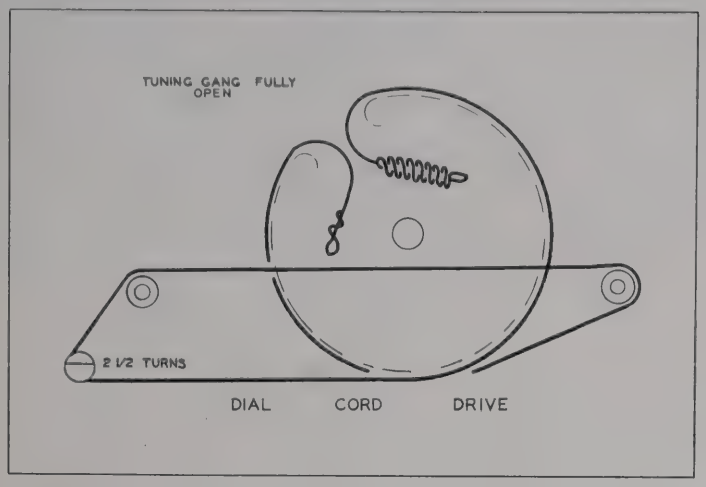
MISCELLANEOUS

ITEM No.	PART NAME	AIR KING PART No.	NOTES
72	Switch	3751	Function
73	"		Record-Play
74	"		Motor
75	Indicator	4926	Neon
76	2 Gang Var. Cap.	16[illegible]	(35-45MMF, 22-1-5MMF)



DISASSEMBLY INSTRUCTIONS

1. Loosen set screws and remove four control knobs.
2. Remove microphone plug from chassis.
3. Remove phono-pickup plug from chassis.
4. Remove recorder motor plug from chassis.
5. Remove plug from recording head.
6. Remove speaker leads from speaker.
7. Remove antenna leads from loop antenna.
8. Remove two screws from top of chassis. Remove three hex head self-tapping screws from rear of chassis. Remove chassis from cabinet.
9. Remove four hex nuts holding speaker in cabinet. Remove speaker from cabinet.



VOLTAGE AND RESISTANCE TAKEN WITH [illegible]

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	7Q7	6.4VAC	225VDC	50VDC	-2VDC§	0V.	-.3VDC	0V.	0V.
2	7A7	0V.	225VDC	50VDC	0V.	0V.	-.3VDC	0V.	6.4VAC
3	7B6	0V.	97VDC	-.6VDC	0V.	-.7VDC	-.7VDC	0V.	6.4VAC
4	7C5	0V.	210VDC	225VDC	225VDC	0V.	0V.	11.5VDC	6.4VAC
5	1273	6.4VAC	32VDC	13VDC	0V.	0V.	-.5VDC	0V.	0V.
6	7C5	0V.	245VDC	225VDC	-40VDC	225VDC	-42VDC	4.5VDC	6.4VAC
7	7Z4	6.4VAC	245VDC	250VAC	0V.	0V.	250VAC	247VDC	0V.

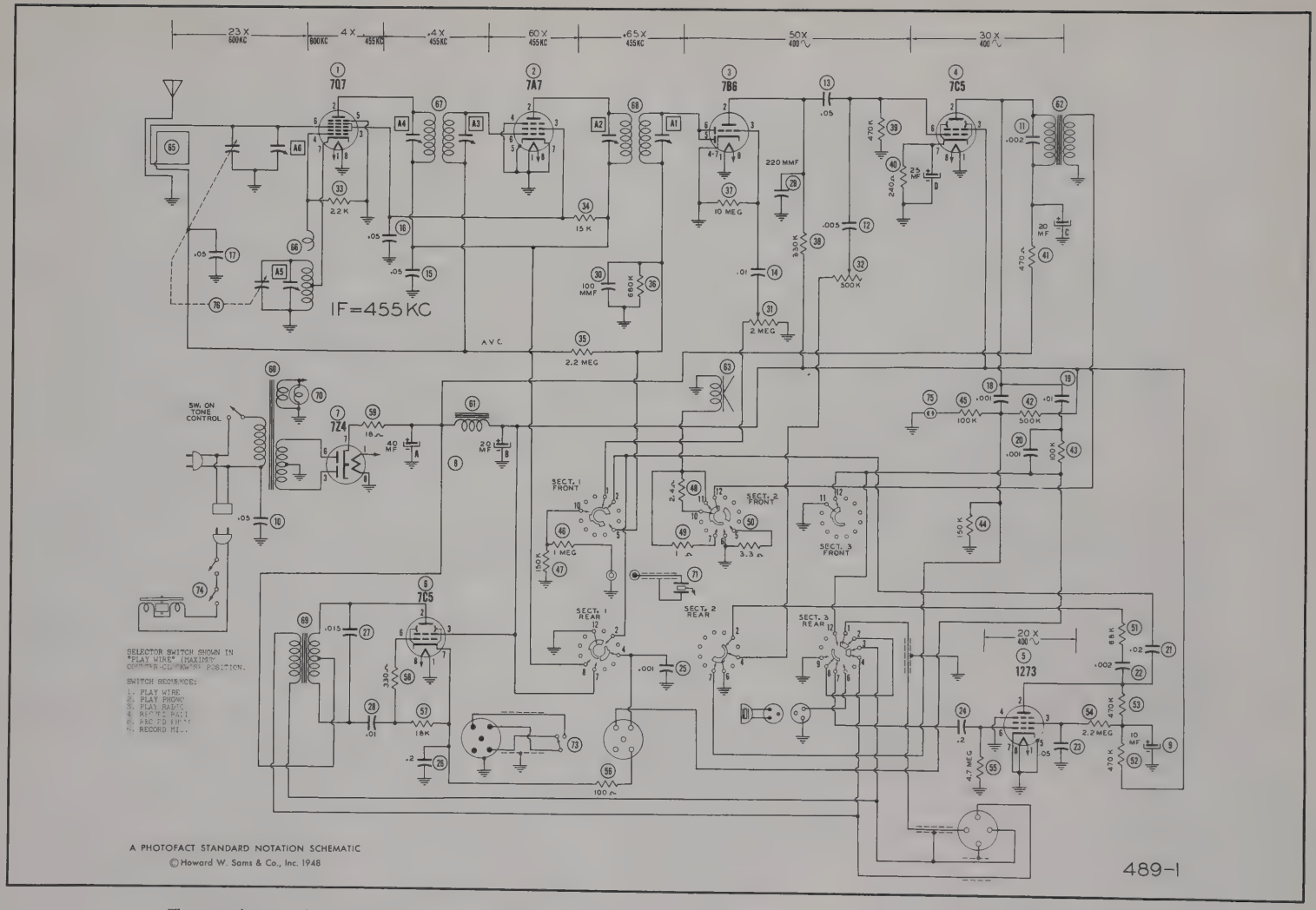
§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	7Q7	.1Ω	70KΩ	85KΩ	22KΩ	0Ω	2.8 Meg	.6Ω	0Ω
2	7A7	0Ω	70KΩ	85KΩ	0Ω	0Ω	2.8 Meg	0Ω	.1Ω
3	7B6	0Ω	400KΩ	10 Meg.	0Ω	680KΩ	680KΩ	0Ω	.1Ω
4	7C5	0Ω	70KΩ	70KΩ	70KΩ	INF.	470KΩ	240Ω	.1Ω
5	1273	.1Ω	1.1 Meg.	2.6 Meg	0Ω	0Ω	4.7 Meg.	0Ω	0Ω
6	7C5	0Ω	70KΩ	70KΩ	18KΩ	70KΩ	18KΩ	100Ω	.1Ω
7	7Z4	.1Ω	70KΩ	95Ω	INF.	INF.	85Ω	70KΩ	0Ω

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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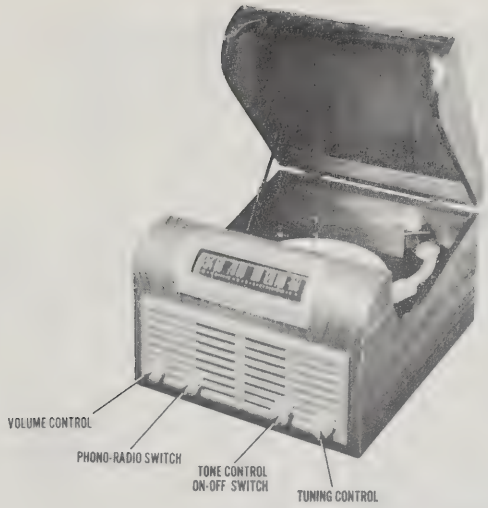
The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

DATE 5/48-#48-1 SET #39-FOLDER #1

ARVIN MODELS 150TC, 151TC
(Ch. RE-228-1)



ARVIN MODEL 151TC

TRADE NAME	Arvin, Models 150TC, 151TC (Ch. RE-228-1)
MANUFACTURER	Noblitt Sparks Industries, Columbus, Indiana
TYPE SET	AC Operated Combination Phono-Radio Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 12BD6 RF Amp., 12BE6 Converter, 12BD6 IF Amp., 12AT6 Det.-AVC-AF, 50L6GT Power Output.
POWER SUPPLY	105-125 Volts AC
TUNING RANGE—BROADCAST	540-1600KC RATING .33 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Complete alignment can be accomplished with chassis mounted in cabinet. It is necessary to remove the screws from the compartment shield loop assembly and lay it back to make the trimmers available, and remove chassis bottom plate to gain access to connections under chassis.

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low freq. end of dial.

Use isolation transformer if available. If not, connect a .1 MFD capacitor in series with low side of signal generator and B-.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.05 MFD	High side to Pin 7 of 6BE6. Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD to reduce hum modulation.
2	.05 MFD	High side to Pin 1 of 12BD6 RF Tube (1). Low side to B-.	"	"	"	A5	Adjust for minimum output.
3		Loop	1400KC	1400KC	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
4		"	"	Tune for maximum output.	"	A7	"

DISASSEMBLY INSTRUCTIONS

1. Remove four push-on type control knobs.
2. Remove seven Phillips head wood screws holding loop antenna in cabinet. Remove leads from loop antenna. Remove loop from cabinet.
3. Remove phono-motor plug from chassis.
4. Remove phono-pickup plug from chassis.
5. Remove two hex nuts holding dial supports.
6. Remove four self-tapping screws holding chassis cover plate to bottom of chassis.
7. Remove speaker plug from chassis.
8. Remove three brass screws holding chassis in cabinet.
9. Remove four hex nuts holding speaker in cabinet. Remove speaker from cabinet.

HOWARD W. SAMS & CO., INC. **Indianapolis Indiana**

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PARTS LIST AND DESCRIPTIONS

ARVIN MODELS 1..7C, 151TC

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: ARVIN PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	12BD6	12BD6	7CC	
2	Converter	12BE6	12BE6	7CH	
3	IF Amp.	12BD6	12BD6	7CC	
4	Det.-AVC-AF	12AT6	12AT6	7BT	
5	Power Output	50L6GT	50L6GT	7AC	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: ARVIN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	50	150	A21349	PRSA150-30-50	BRD5315	DSB-5030-150	TA-530	Filter-Red
B	30	150						" -Blue
7	.05	400		484-05	DT4S5	ST-4-05	TC-15	Line Filter
8	.1	400	C20068-104	484-.1	DT4P1	ST-4-1	TC-1	Line Isolation
9	.01	400	C20068-103	484-01	DT4S1	ST-4-01	TC-11	Output Plate Bypass
10	.003	600	C20069-302	684-003	DT6D3	ST-6-003	TC-23	Tone Compensation
11	.01	400	C20068-103	484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
12	.05	200	C20067-503	454-05	DT4S5	ST-4-05	TC-15	Phono Isolation
13	.05	200	C20067-503	484-05	DT4S5	ST-4-05	TC-15	AVC Filter
14	.005	400	C20068-502	484-005	DT6D5	ST-6-005	TC-25	Audio Coupling
15	.01	400	C20068-103	484-01	DT4S1	ST-4-01	TC-11	External Ant. Isolation
16	250		C20065-251	1468-00025	5W5T25	MO.5-325	1FM-325	AF Plate Bypass
17	250		C20065-251	1468-00025	5W5T25	MO.5-325	1FM-325	Diode RF Filter
18	250		C20065-251	1468-00025	5W5T25	MO.5-325	1FM-325	RF Filter
19	50		C20065-500	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.
20	250		C20065-251	1468-00025	5W5T25	MO.5-325	1FM-325	RF Coupling
21	30			1469-000025	5W5Q3	MO.5-43	MS-43	Fixed Padder

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ARVIN PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
22A	1 Meg.	½	C19927	D13-137	AM-63-Z	Volume Control
B	Shaft		Not Req.	E	KS8-3	Attach to 22A per instructions
23A	500KΩ	½	C19928	D13-133	AM-60-Z	Tone Control
B	Shaft		Not Req.	E	KS8-3	Attach to 23A per instructions
C	Switch		" "	41	SW-A	" " " " "

RESISTORS

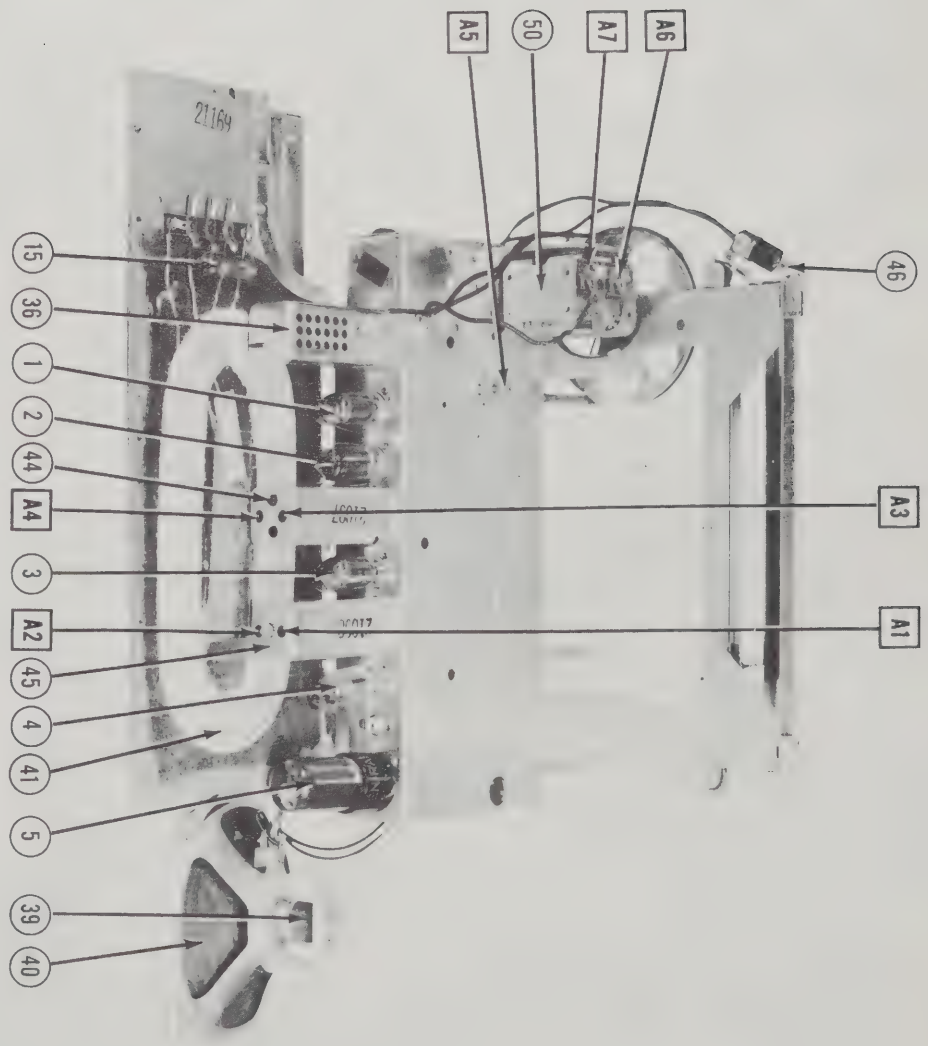
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ARVIN PART No.	IRC PART No.	IDENTIFICATION CODES
24	2200Ω	½	C20060-222	BTS-2200	Red-Red-Red RF Plate Load
25	22KΩ	½	C20060-223	BTS-22K	Red-Red-Or. Osc. Grid
26	10 Meg.	½	C20060-106	BTS-10 Meg.	Brn.-Blk.-Blue AVC Network
27	220KΩ	½	C20060-224	BTS-220K	Red-Red-Yl. Converter Grid
28	2.2 Meg.	½	C20060-225	BTS-2.2 Meg.	Red-Red-Yl. AVC Network
29	1 Meg.	½	C20060-105	BTS-1 Meg.	Brn.-Blk.-Grn. Series Phono
30	10 Meg.	½	C20060-106	BTS-10 Meg.	Brn.-Blk.-Blue AF Grid
31	470KΩ	½	C20060-474	BTS-470K	Yl.-Vi.-Yl. AF Plate Load
32	150Ω	½	C20060-151	BW-½-150	Brn.-Grn.-Brn. Output Cathode
33	1200Ω	2	C20223-122	BT-2-1200	Brn.-Red-Red Filter
34	22Ω	½	C20060-220	BW-½-22	Red-Red-Blk. Rectifier Ballast
35	330KΩ	½	C20060-334	BTS-330K	Or.-Or.-Yl. Line Isolation
36			AC21489-1		Line Dropping-See Note

Note-Special negative temperature coefficient resistor. Order from manufacturer.

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: ARVIN PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
38	2500Ω	3.9Ω	100Ω tapped @ 1½Ω	.4Ω	AC21494-1	A-3876*		A-2928*	Add extra filter to reduce hum level.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			ARVIN PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.				
39	PM	3.9Ω	C21064		4A07	
	CONE DIA.	VC DIA.				
40	5-1/8"	1/2"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	ARVIN PART No.	MEISSNER PART No.	
41	Loop Ant.	.2Ω	1Ω	AD-21169-1		
42	Osc. Coil	.7Ω	5.2Ω	AC-21187-1	14-1060	
43	IF Trap		21.7Ω	AC-21158-1		
44	Input IF	12.6Ω	12.6Ω	AC-21097-1	16-6658	
45	Output IF	11.5Ω		AC-21098	16-6670	

DIAL LIGHT

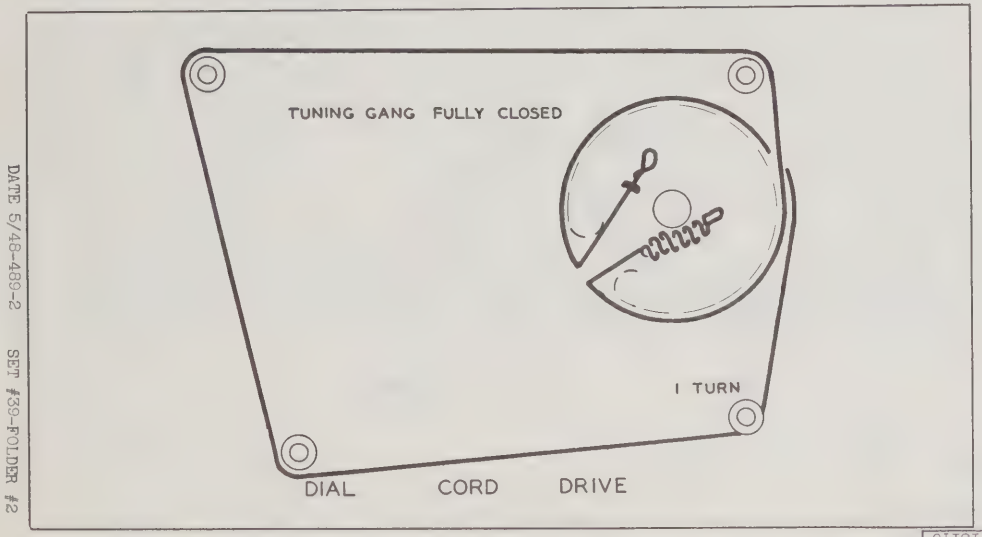
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					ARVIN PART No.		
46	Bayonet	6-8	0.15	Brown	A19351		Type 47

PHONO CARTRIDGE

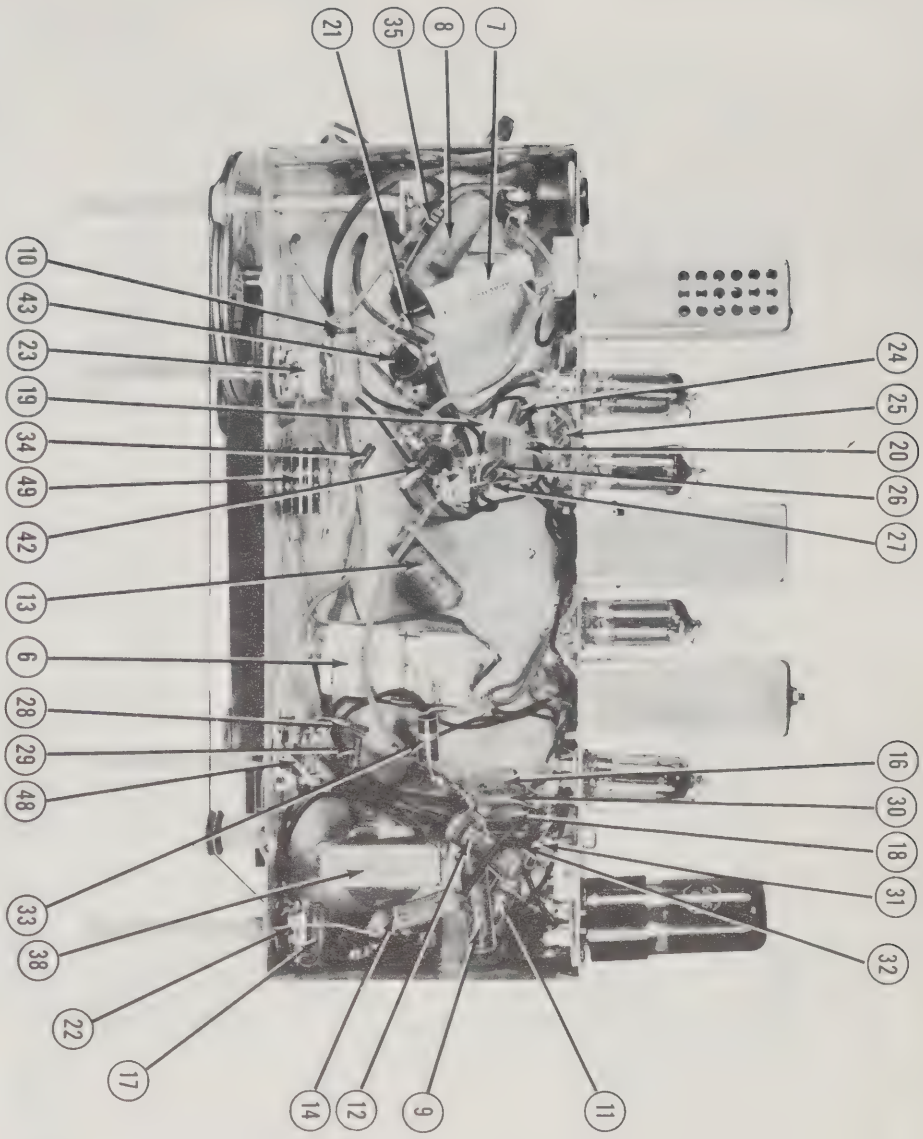
ITEM No.	REPLACEMENT DATA		REMARKS
	ARVIN PART No.	ASTATIC PART No.	
47		L-70-A	L-70-S original part.

MISCELLANEOUS

ITEM No.	PART NAME	ARVIN PART No.	NOTES
48	Switch	C19930	Radio-Phono
49	Rectifier	A20207-2	Selenium
50	2 Gang Var. Cap.	AD21111-1	(22-445MMF, 33-200MMF)
	Dial	D21091	Glass
	Dial Pointer	A21090	

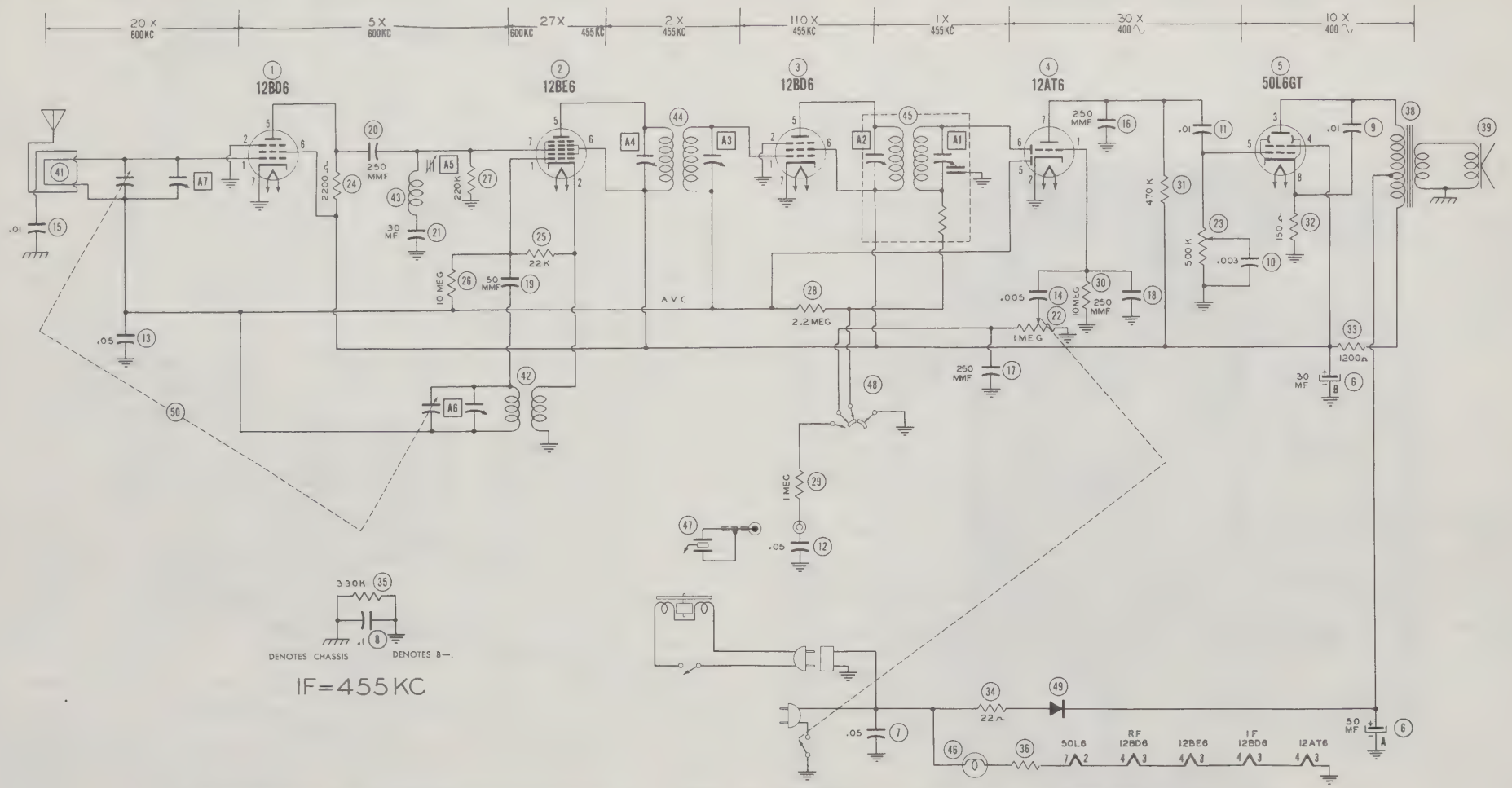


CHASSIS—BOTTOM VIEW



ARVIN MODELS 1507C, 1517C

ARVIN MODELS 1507C, 1517C



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1					40VAC				–
2		-13VDC§							–
3									–
4					13VAC				–
5									–

§TAKEN WITH VACUUM TUBE VOLTMETER

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1									–
2									–
3									–
4									–
5									–

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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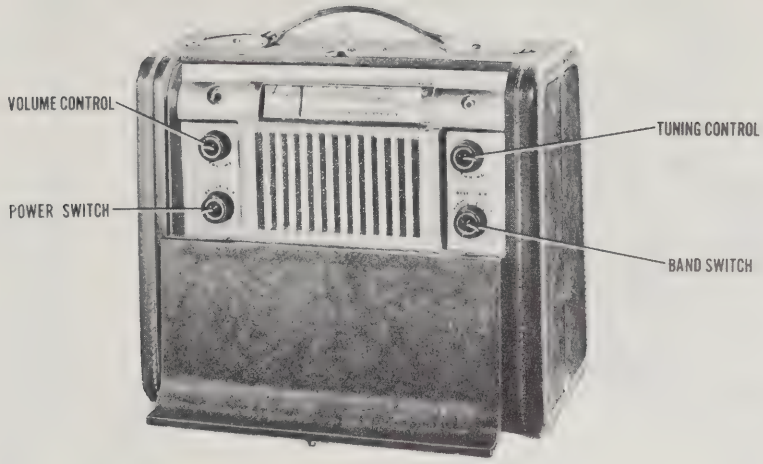
489-2

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. **DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.**
2. **Socket connections are shown as bottom views.**
3. **Measured values are from socket pin to common negative.**
4. **Line voltage maintained at 117 volts for voltage readings.**
5. **Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.**
6. **Volume control at maximum, no signal applied for voltage measurements.**



BENDIX MODEL PAR-80A

TRADE NAME	Bendix, Model PAR-80A
MANUFACTURER	Bendix Radio, Div. of Bendix Aviation Corp., Baltimore, Md.
TYPE SET	Three Power Operated Portable Air-Marine-Broadcast Superheterodyne Receiver
TUBES (SIX)	Types, 1T4 RF Amp., 1R5 Converter, 1T4 IF Amp., 1S5 Det.-AVC-AF, 3Q4 Power Output, 117Z3 Rectifier
POWER SUPPLY	105-125 Volts AC-DC or 9 Volts "A" Supply and 90 Volts "B" Supply in Pack Form
RATING	.15 Amp. @ 117 Volts AC or 55MA @ 9 Volts DC and 11MA @ 90 Volts DC
TUNING RANGE—BROADCAST	540-1600KC **SHORT WAVE** 2-5.5MC LONG WAVE 200-400KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Alignment of broadcast band necessitates alignment of air band.
To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low freq. end of dial.
Use battery power when available. If AC power is used, use an isolation transformer when available. If not, connect a .1 MFD capacitor in series with low side of the signal generator and B-.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.01 MFD.	High side to Pin 6 (grid) 1R5. Low side to B-.	455KC	BC (1 position clockwise)	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If AC power is used without an isolation transformer reduce dummy ant. to 200 MMF. to reduce hum modulation.
2	400Ω carbon res.	High side to ant. jack. Low side to ant. ground.	5.5MC	Marine (fully counter-clockwise)	5.5MC	"	A5	Adjust for maximum output.
3	"	"	"	"	Tune for maximum output.	"	A6,A7	Adjust for maximum output. Repeat Steps 2 & 3 until no further improvement can be made.
4	100MMFD	"	1550KC	BC	1550KC	"	A8	Adjust for maximum output.
5	100MMFD	"	"	"	Tune for maximum output.	"	A9,A10	" " " "
6	100MMFD	"	600KC	"	"	"	A11	Rock tuning cap. and adjust for maximum output. Repeat Steps 4, 5 & 6 until no further improvement can be made. Continue with air band alignment Step 7.
7	100MMFD.	High side to ant. jack. Low side to ant. ground.	400KC	Air (2 positions clockwise)	400KC	Across voice coil	A12	Adjust for maximum output.
8	100MMFD.	"	"	"	Tune for maximum output.	"	A13,A14	" " " "
9	100MMFD	"	200KC	"	200KC	"	A15	Rock tuning cap. and adjust for maximum output. Repeat Steps 7, 8 & 9 until no further improvement can be made.
10	100MMFD	"	455KC	"	Tuning cap. fully open.	"	A16	Adjust for minimum output.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: BENDIX PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	1T4	1T4	6AR	
2	Converter	1R5	1R5	7AT	
3	IF Amp.	1T4	1T4	6AR	
4	Det.-AVC-AF	1S5	1S5	6AU	
5	Power Output	3Q4	3Q4	7BA	
6	Rectifier	117Z3	117Z3	4BF	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: BENDIX PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7A	40	150	CH267020-1	AF84D20A	UP4CJ65	DY-304	EL-351	▲ Filter
B	20	150						■ "
C	100	25						Filament Bypass
8	25	25	CH267014-1	PRS25-25	BR252A	M-25-25	TA-25	" "
9	.05	200	CH267000-503	484-05	DT2S5	ST-4-05	TC-15	Line Filter
10	.1	200	CH267000-104	484-.1	DT2P1	ST-2-1	TC-1	Line Isolation
11	.002	600	CH267003-202	464-002	DT6D2	ST-6-002	TC-22	Output Plate Bypass
12	.05	120	CH267033-503	484-05	DT2S5	ST-4-05	TC-15	Fixed Trimmer
13	.002	200	CH267000-202	464-002	DT6D2	ST-6-002	TC-22	Audio Coupling
14	.01	200	CH267000-103	484-01	DT2S1	ST-4-01	TC-11	AF Screen Bypass
15	.1	200	CH267000-104	484-.1	DT2P1	ST-2-1	TC-1	AF Plate Decoupling
16	.002	200	CH267033-503	464-002	DT6D2	ST-6-002	TC-22	Audio Coupling
17	.05	200	CH267000-503	484-05	DT2S5	ST-4-05	TC-15	Screen Bypass
18	.1	200	CH267000-104	484-.1	DT2P1	ST-2-1	TC-1	Filament Bypass
19	.05	200	CH267000-503	484-05	DT2S5	ST-4-05	TC-15	IF Plate Decoupling
20	.05	200	CH267000-503	484-05	DT2S5	ST-4-05	TC-15	Filament Bypass
21	.01	200	CH267000-103	484-01	DT2S1	ST-4-01	TC-11	Osc. Feedback
22	.05	200	CH267000-503	484-05	DT2S5	ST-4-05	TC-15	AVC Filter
23	.05	200	CH267000-503	484-05	DT2S5	ST-4-05	TC-15	Filament Bypass
24	.05	200	CH267000-503	484-05	DT2S5	ST-4-05	TC-15	AVC Filter
25	.002	200	CH267033-503	484-002	DT6D2	ST-6-002	TC-22	Ant. Isolation
26	390	500	CH267503-391	1468-0004	5W5T4	MO.5-34	1FM-34	AF Plate Bypass
27	1800	500	CH267515-182					Fixed Pad
28	47	500	CH267500-470	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.
29	18	500	CH267503-180		5W5Q2	MOS.5-42	MS-42	RF Coupling
30	100	500	CH267500-101	1468-0001	5W5T1	MO.5-31	1FM-31	" "
31	3.3	500	CH267007-003					" " -Cer.
32	22	500	CH267500-220					Fixed Trimmer

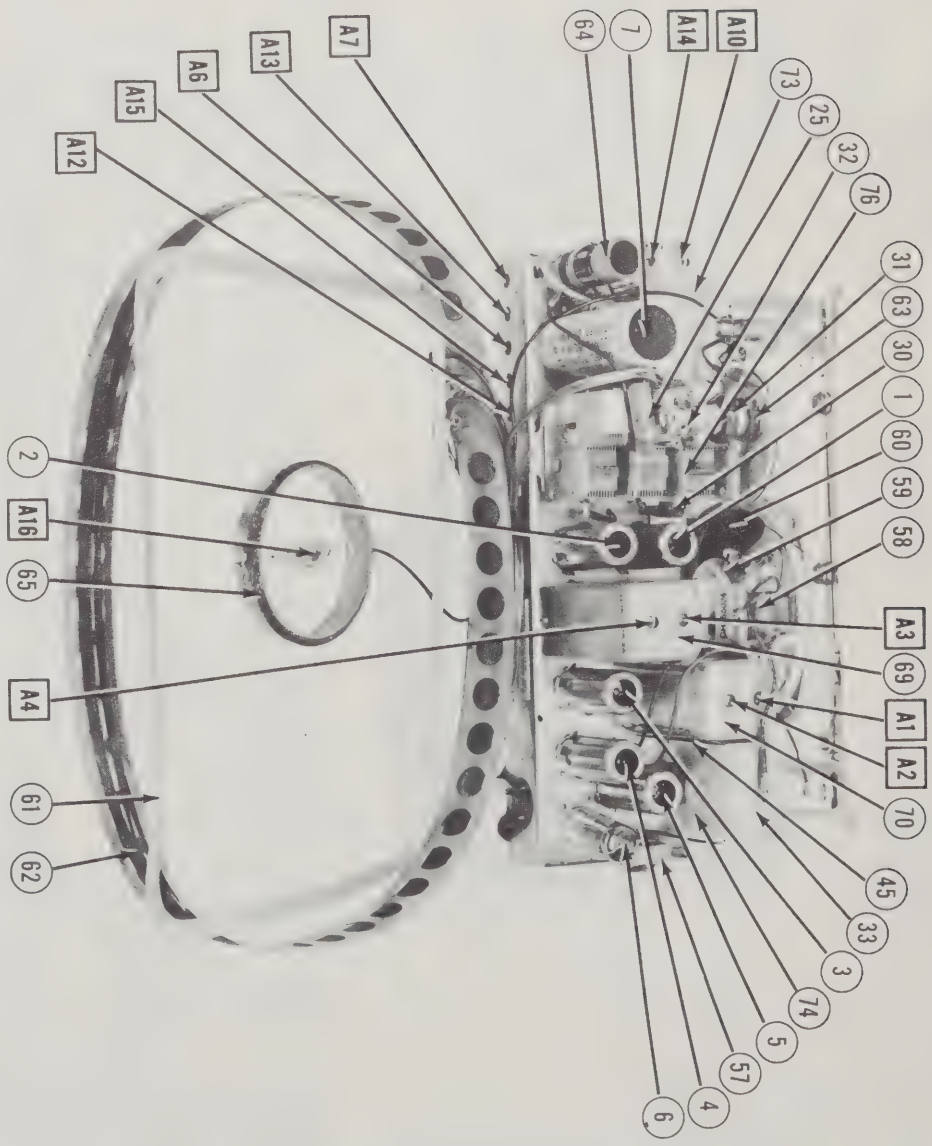
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: BENDIX PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
33A	500KΩ	½	CH262010-1	D11-133	M-58-S	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 33A per instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: BENDIX PART No.	IRC PART No.	IDENTIFICATION CODES
34	220KΩ	½	CH268500-224	BTS-220K	Red-Red-Yl. RF Grid
35	3.3 Meg.	½	CH268500-335	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
36	4.7 Meg.	½	CH268504-475	BTS-4.7 Meg.	Yl.-Vi.-Grn. " "
37	33KΩ	½	CH268500-333	BTS-33K	Or.-Or.-Or. RF Plate Load
38	22KΩ	½	CH268500-223	BTS-22K	Red-Red-Or. Converter Screen Dropping
39	100KΩ	½	CH268500-104	BTS-100K	Br.-Blk.-Yl. Osc. Grid
40	8.2 Meg.	½	CH268504-825	BTS-8.2 Meg.	Gray-Red-Grn. AVC Network
41	6800Ω	½	CH268500-682	BTS-6800	Blue-Gray-Red IF Plate Decoupling
42	470KΩ	½	CH268500-474	BTS-470K	Yl.-Vi.-Yl. Diode Filter
43	470KΩ	½	CH268500-474	BTS-470K	Yl.-Vi.-Yl. Diode Load

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	BENDIX PART No.	IRC PART No.	
44	47KΩ	½	CH268505-473	BTS-47K	Yl.-Vl.-Or. Voltage Dropping-See Note
45	68KΩ	½	CH268505-683	BTS-68K	Blue-Gray-Or. " "
46	4.7 Meg.	½	CH268504-475	BTS-4.7 Meg.	Yl.-Vl.-Grn. AF Grid
47	3.3 Meg.	½	CH268500-335	BTS-3.3 Meg.	Or.-Or.-Grn. AF Screen Dropping
48	220KΩ	½	CH268500-224	BTS-220K	Red-Red-Yl. AF Plate Load
49	100KΩ	½	CH268500-104	BTS-100K	Br.-Blk.-Yl. AF Plate Decoupling
50	3.3 Meg.	½	CH268500-335	BTS-3.3 Meg.	Or.-Or.-Grn. Tone Compensation
51	1 Meg.	½	CH268500-105	BTS-1 Meg.	Br.-Blk.-Grn. Output Grid
52	680Ω	½	CH268504-681	BTS-680	Blue-Gray-Br. Filament String
53	1000Ω	1	CH268503-102	BTA-1000	Br.-Blk.-Red Filter
54	2200Ω	10.9	CH268004-2	AB-2250	Filament Dropping
55	50Ω	1	CH268002-500	BW-1-47	Grn.-Blk.-Blk. Surge Limiter
56	100Ω	1	CH268003-101	BW-1-100	Br.-Blk.-Br. Line Dropping

Note-Used in early production only. To be shorted out if volume can not be reduced on local stations.

TONE CHOKE

ITEM NO.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	BENDIX PART NO.	STANCOR PART NO.	THORDARSON PART NO.	MERIT PART No.	
57	.006A	60Ω	.49 Henries	CH265031				

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		BENDIX PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
58	8500Ω	600Ω tapped @ 3.3Ω	480Ω	85Ω tapped @ .3Ω	CH265034-1				

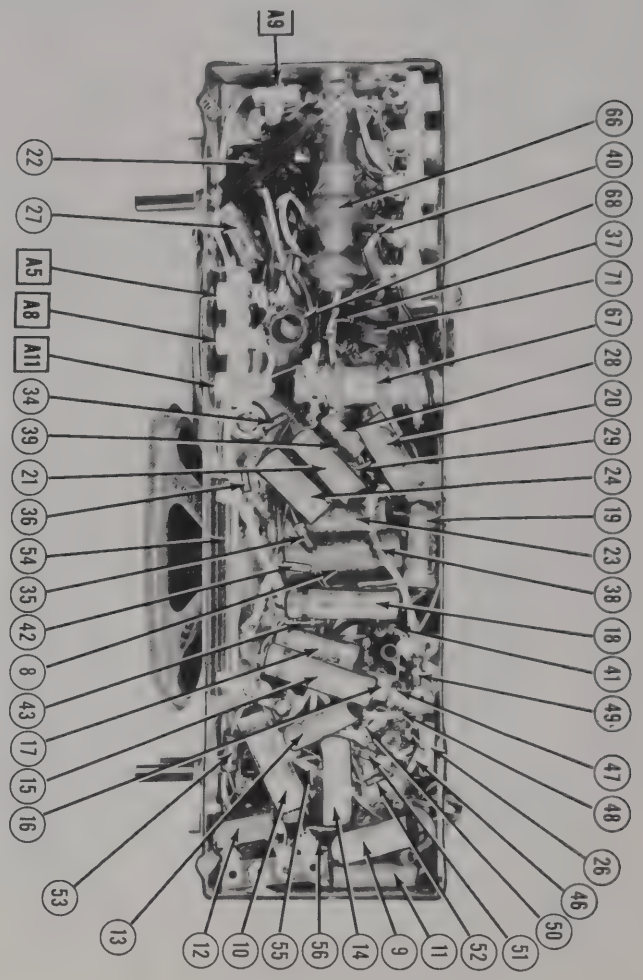
SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			BENDIX PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.		8T-107†		†Drill and tap magnet frame.
59	PM	3.3Ω	LH256009-2	Mod. P5-V	5A1#	#Drill new mounting holes.
	CONE DIA.	VC DIA.				
60	4"	½"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	BENDIX PART No.	MEISSNER PART No.	
61	Loop Ant.		.7Ω	LH254014-2		
62	LF Loop Ant.		21Ω	NH251141-1		
63	BC & LF Ant. Coil	105Ω	1.2Ω	LH259060-1		
64	HF Ant. Coil	.5Ω	.5Ω	LH259041-1		
65	IF Trap		26Ω	CH259067-1		
66	RF Coil		7.5Ω	LH259040-1		
67A	LF Osc.Coil		6Ω	LH259039-1		
B	BC " "		5.8Ω			
68	HF " "		2.3Ω	LH259034-1		
69	Input IF	17Ω	19Ω	LH251075-2	16-6658	
70	Output IF	15Ω		LH251070-1	16-6670	
71	Plate Choke		170Ω	CH259067-1		

CHASSIS—BOTTOM VIEW



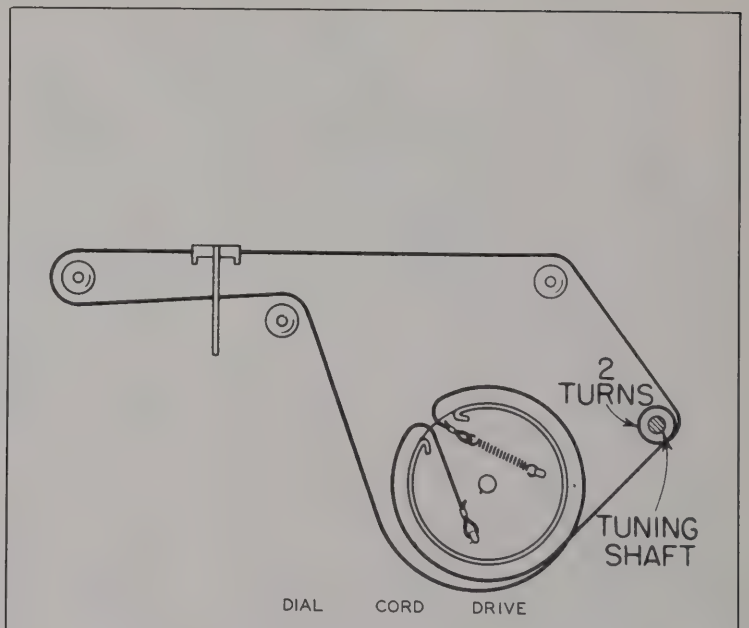
PARTS LIST AND DESCRIPTIONS (Continued)

BATTERIES

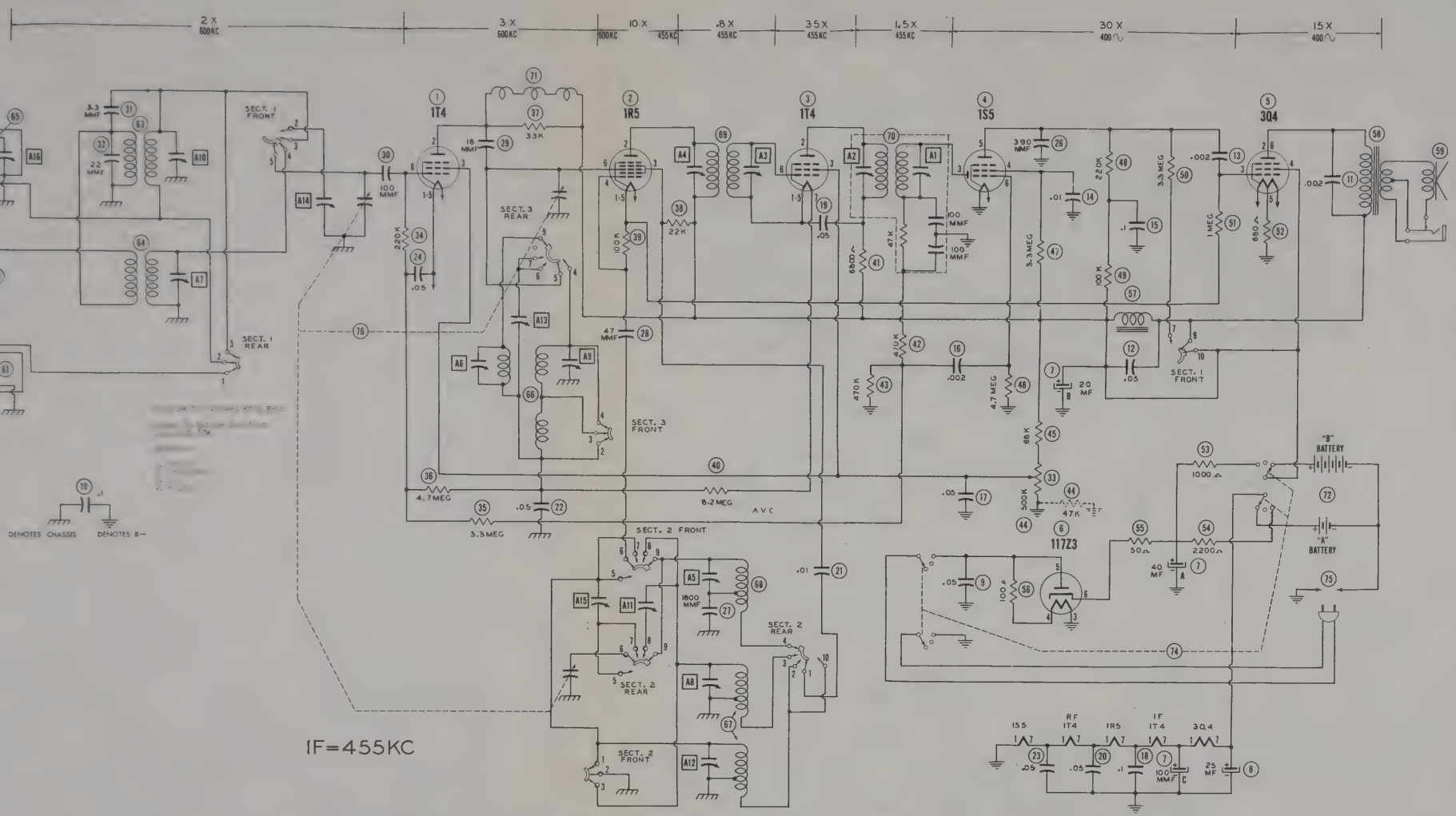
ITEM No.	VOLTAGE	BENDIX PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
72	9V "A" 90V "B"				#754			G6M90	

MISCELLANEOUS

ITEM No.	PART NAME	BENDIX PART No.	NOTES
73	Switch	LH258014	Band
74	"	CH258007-1	AC/DC-Off-Batt.
75	Receptacle	AH258020	AC/DC Plug
76	3 Gang Var. Cap.	NH260025-1	(15-453MTF) each section
A9	Trimmer	AH260035-1	BC RF Adj.
	Trimmer Strip	CH260032-1	A5, A8, A11
	" "	CH260031-1	A6, A7, A12, A13, A15
	" "	CH260030-1	A10, A14
A36	Trimmer	CH260042-4	Trap Adj.
	Jack	AH274086	Phone
	Dial	CH257562	
	Dial Pointer	CH270244-2	



DATE 5/48-#409-3
SET #39-FOLDER #3



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1T4	[illegible]	102VDC	0V.	0V.	1.4VDC	.05VDC	[illegible]
2	1R5	[illegible]	102VDC	55VDC	-9VDC§	2.6VDC	.05VDC	[illegible]
3	1T4	[illegible]	102VDC	0V.	102VDC	4VDC	4VDC	[illegible]
4	1S5	[illegible]	115VDC	0V.	67VDC	[illegible]	[illegible]	1.4VDC
5	3Q4	[illegible]	100VDC	.1VDC	102VDC	6.4VDC	100VDC	[illegible]
6	11723	[illegible]	0V.	112VAC	0V.	117VAC	117VDC	[illegible]

§TAKEN WITH VACUUM TUBE VOLTMETER.

VOLTAGE AND RESISTANCE READINGS TAKEN IN AC-DC POSITION.

VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1T4	*	3KΩ	0Ω	INF.	*	4 Meg.	*
2	1R5	*	3KΩ	22KΩ	100KΩ	*	4 Meg.	*
3	1T4	*	9.8KΩ	0Ω	9.8KΩ	*	*	*
4	1S5	*	4 Meg.	900KΩ	3.3 Meg	320KΩ	4.7 Meg.	*
5	3Q4	*	3KΩ	1 Meg.	3KΩ	*	3KΩ	*
6	11723	500Ω	INF.	400Ω	0Ω	500Ω	2KΩ	INF.

*DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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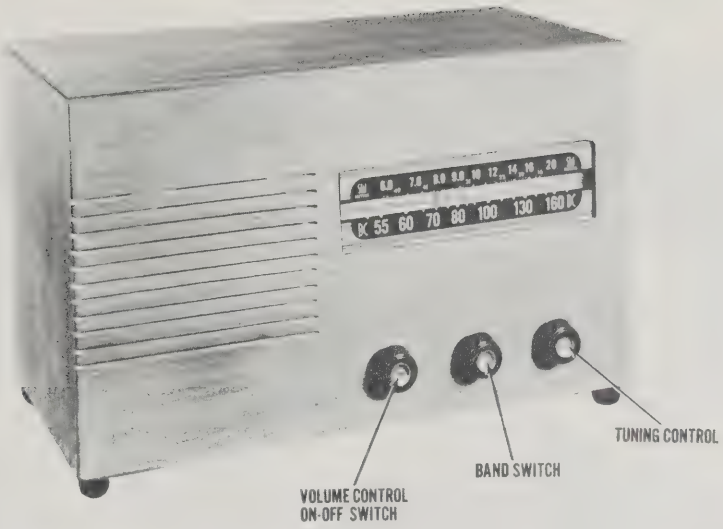
The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by shorting across diode load Item #43.

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - Volume control at minimum, no signal applied for voltage measurements.



FERRAR MODEL T-61B

TRADE NAME	Ferrar, Model T-61B
MANUFACTURER	A. E. Ferrar, 55 W. 26th St., New York, N. Y.
TYPE SET	AC-DC Operated 2 Band Superheterodyne Receiver with Loop Antenna
TUBES (Six)	Types 14A7 RF Amp., 14Q7 Converter, 14A7 IF Amp., 14B6 Det.-AVC-AF, 35L6GT or 35A5 Power Output, 35Y4 Rectifier.
POWER SUPPLY	110-120 Volts AC-DC — RATING .23 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540-1700KC — **SHORT WAVE** 5.8-21.5 MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not, connect a .1 MFD capacitor, in series with low side of signal generator and chassis.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD	High side to front stator of tuning capacitor. Low side to chassis.	456KC	BC (Counter Clock-wise)	Tuning capacitor fully open.	Across voice coil	A1,A2, A3,A4	Adjust for maximum output. If AC power is used without an isolation transformer reduce dummy ant. to 200 MMF to reduce hum modulation.
2	400Ω	High side to ext. ant. lug. Low side to chassis.	21.5MC	SW (Clock-wise)	Tuning capacitor fully open.	Across voice coil	A5	Adjust for maximum output. Tune Sig.Gen. to 22.4MC. If signal is not heard retune Sig. Gen. to 21.5MC and open A5 to next peak. Adjust for maximum output and recheck for image.
3	400Ω	High side to ext. ant. lug. Low side to chassis.	18MC	SW (Clock-wise)	Tune for maximum output.	Across voice coil	A6	Rock tuning cap. and adjust for maximum output.
4	400Ω	High side to ext. ant. lug. Low side to chassis.	10MC	SW (Clock-wise)	Tune for maximum output	Across voice Coil	A7	Rock tuning cap. and adjust for maximum output. Repeat steps 2,3 & 4 until no further improvement can be made. (At least 3 times.)
5	200 MMFD	High side to ext. ant. lug. Low side to chassis.	1700KC	BC	Tuning capacitor fully open.	Across voice coil	A8	Adjust for maximum output.
6	200 MMFD	High side to ext. ant. lug. Low side to chassis.	1450KC	BC	Tune for maximum output.	Across voice coil	A9	Adjust for maximum output.
7	200MMFD	High side to ext. ant. lug. Low side to chassis.	850KC	BC	Tune for maximum output.	Across voice coil	A10	Rock tuning cap. and adjust for maximum output.
8	200 MMFD	High side to ext. ant. lug. Low side to chassis.	600KC	BC	Tune for maximum output.	Across voice coil	A11	Rock tuning cap. and adjust for maximum output. Repeat steps 5, 6, 7, 8 until no further improvement can be made.. (At least three times.)

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: FERRAR PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	14A7	14A7	8V	
2	Converter	14A7	14A7	8AL	
3	IF Amp.	14A7	14A7	8V	
4	Det.-AVC-AF	14B6	14B6	8W	
5A	Power Output	35L6GT	35L6GT	7AC	
B	" "	35A5	35A5	6AA	
6	Rectifier	35Y4	35Y4	5AL	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: FERRAR PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SPRAGUE PART No.	SOLAR PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7A	40	150		PRSA150-40-	BRD4415	TA-240	M-2x40-150	Filter
B	40	150		40				"
8	.1	400		484-.1	DT4P1	TC-1	ST-4-1	Line Filter
9	.01	400		484-01	DT4S1	TC-11	ST-4-01	Output Plate Bypass
10	.01	400		484-01	DT4S1	TC-11	ST-4-01	Audio Coupling
11	.25	400		484-.25	DT4P25	TC-2	ST-4-25	AF Plate Decoupling
12	.01	400		484-01	DT4S1	TC-11	ST-4-01	Audio Coupling
13	.1	400		484-.1	DT4P1	TC-1	ST-4-1	IF Cathode Bypass
14	.25	400		484-.25	DT4P25	TC-2	ST-4-25	RF Bypass Pwr. Supply
15	.1	400		484-.1	DT4P1	TC-1	ST-4-1	AVC Filter
16	.01	400		484-01	DT4S1	TC-11	ST-4-01	Ext. Ant. Isolation
17	100	500		1468-0001	5W5T1	1FM-31	MO.5-31	Diode RF Filter
18	100	500		1468-0001	5W5T1	1FM-31	MO.5-31	" " "
19	100	500		1468-0001	5W5T1	1FM-31	MO.5-31	Osc. Grid Cap.
20	150	500		1469-00015	5W5T15	MS-315	MOS.5-315	Fixed Pad
21	5000	300		1484-005	1DR5D5	MS-25	MWS.5-25	" "
22	100	500		1468-0001	5W5T1	1FM-31	MO.5-31	RF Coupling
23	100	500		1468-0001	5W5T1	1FM-31	MO.5-31	" "

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: FERRAR PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
24A	500KΩ	½	21-2	D13-133	M-60-Z	Volume Control
B	Shaft			A	Not Req.	Attach to 24A per instructions
C	Switch			41	SW-A	" " " " "

RESISTORS

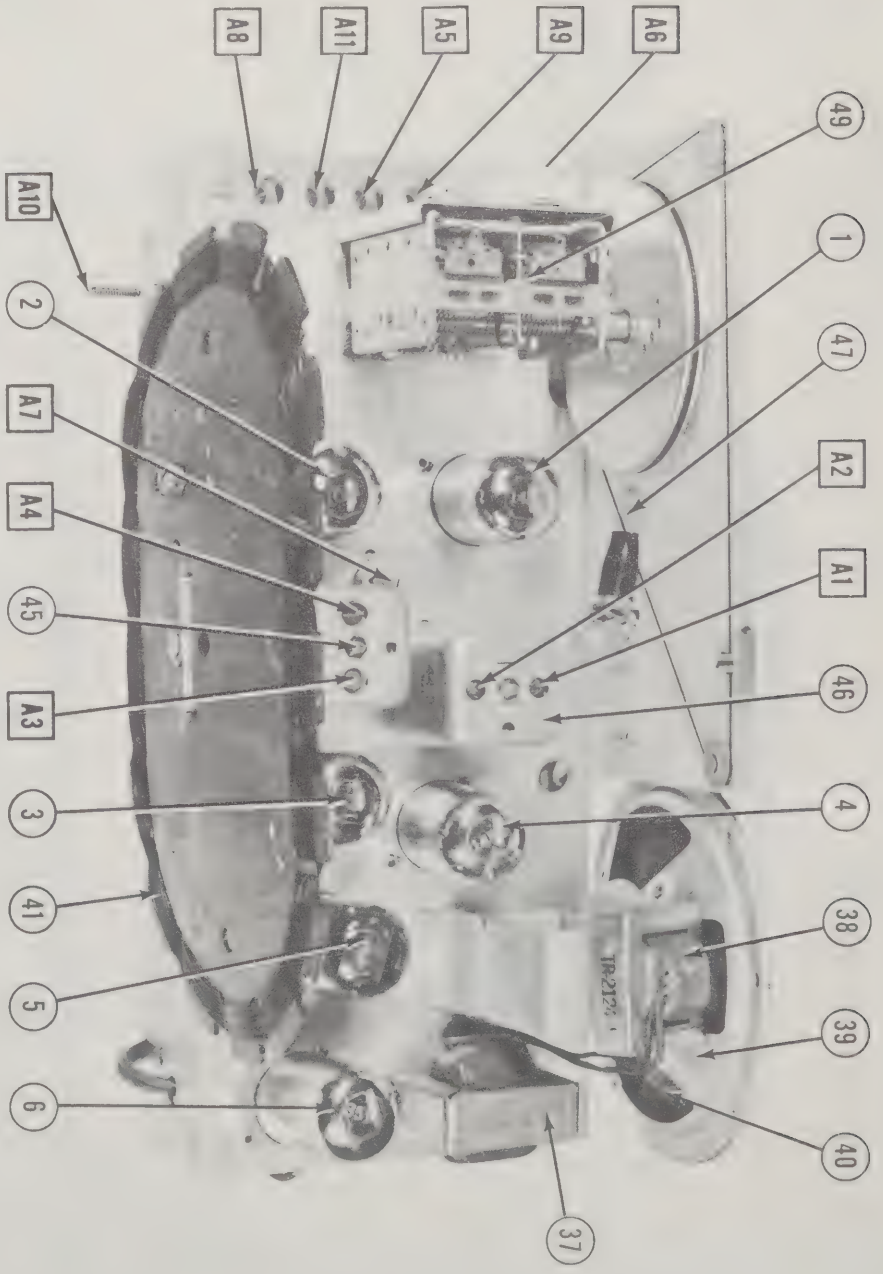
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: FERRAR PART No.	IRC PART No.	IDENTIFICATION CODES
25	500KΩ	½		BTS-470K	Grn.-Blk.-Yl. RF Grid
26	2000Ω	½		BTS-2200	Red-Blk.-Red RF Plate Load
27	47KΩ	½		BTS-47K	Grn.-Br.-Or. Converter Grid
28	22KΩ	½		BTS-22K	Red-Blk.-Or. Oscillator Grid
29	2.2 Meg.	½		BTS-2.2 Meg.	Red-Red-Grn. AVC Network
30	470Ω	½		BTS-470	Grn.-Br.-Br. IF Cathode
31	47KΩ	½		BTS-47K	Grn.-Br.-Or. Diode RF Filter
32	4.7 Meg.	½		BTS-4.7 Meg.	Grn.-Br.-Grn. AF Grid
33	220KΩ	½		BTS-220K	Red-Red-Yl. AF Plate Load
34	47KΩ	½		BTS-47K	Grn.-Br.-Or. AF Plate Decoupling
35	500KΩ	½		BTS-470K	Grn.-Blk.-Yl. Output Grid
36	220Ω	1		BW-1-220	Red-Red-Br. Output Cathode
50	200Ω	1		BW-1-220	Red-Blk.-Br. Pilot Light Shunt-See Note

Note-Not used in all models.

FILTER CHOKE

ITEM NO.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D.C. RESISTANCE	RATINGS: INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA: FERRAR PART NO.	STANCOR PART NO.	THORDARSON PART NO.	MERIT PART No.	INSTALLATION NOTES
37	.05A	160Ω	4 Henries	52-2	C-1706		C-2577*	*Drill one new mounting hole.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		FERRAR PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
38	1600Ω	3.2Ω	170Ω	.6Ω		A-3876	T22S45	A-2928	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			FERRAR PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.		ST-105†		†Drill and tap magnet frame.
39	PM	3.2Ω	80-3	Mod. P5-X	5A1#	#Fabricate new mounting bracket.
	CONE DIA.	VC DIA.				
40	4-5/8"	1/2"				

R F COILS

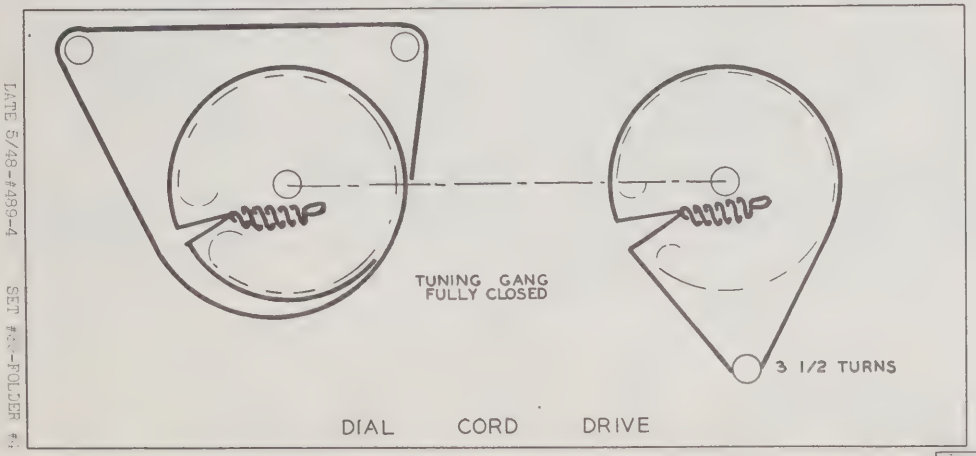
ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	FERRAR PART No.	MEISSNER PART No.
41	Loop Ant.	.3Ω	.8Ω	45-4	
42	SW Ant.Coil	.2Ω	0Ω	40-3	
43	BC Osc. "	.7Ω	3.8Ω	42-1	14-1060
44	SW " "	0Ω	0Ω	42-4	
45	Input IF	18Ω	18Ω	44-1	16-6658
46	Output IF	17Ω	18Ω	44-2	16-6660

DIAL LIGHT

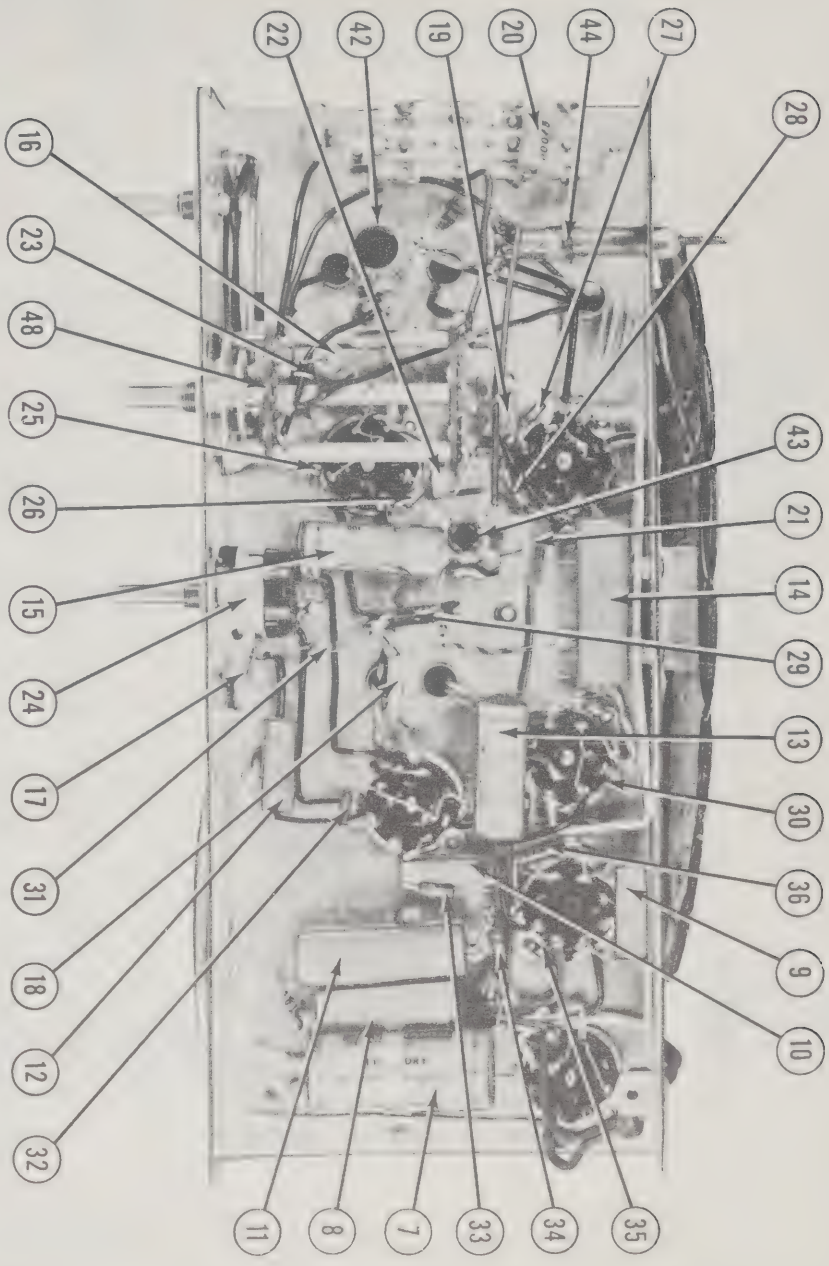
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					FERRAR PART No.		
47	Bayonet	6-8	0.15	Brown	S-47		Type 47

MISCELLANEOUS

ITEM No.	PART NAME	FERRAR PART No.	NOTES
48	Switch	30-5	Band
49	2 Gang Var. Cap.	60-6	(15-520MMF) each section
A5	Trimmer Strip	63-4	SW Ant. Adj.
A8			BC Osc. Adj.
A9			BC Ant. Adj.
A11			BC Osc. Pad.
A6	Trimmer	63-1	SW Ant. Adj.
	Dial Pointer	75-3	



CHASSIS—BOTTOM VIEW



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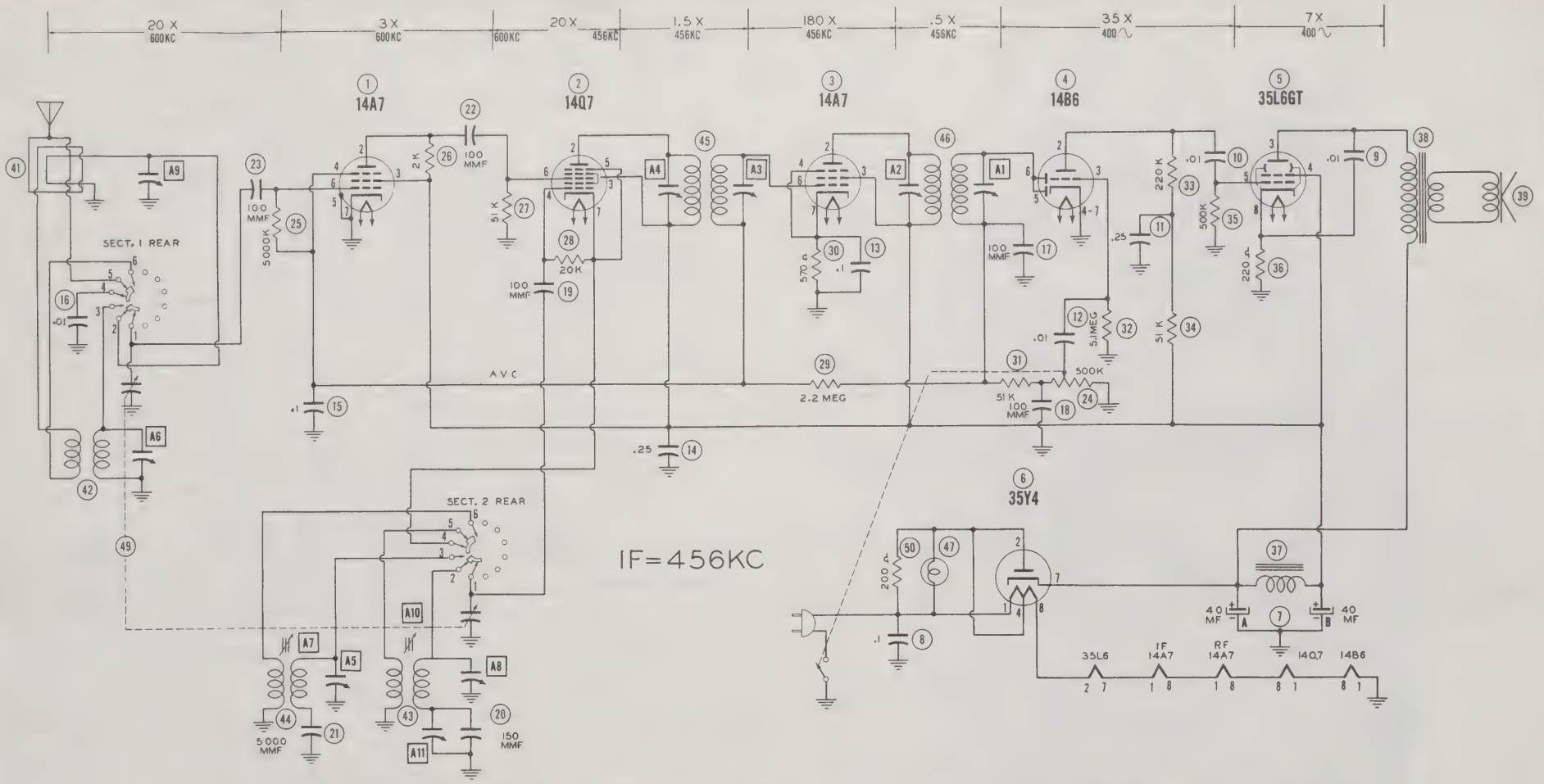

VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	14A7	[illegible]	[illegible]	[illegible]	-.6VDC	0V.	-.2VDC	0V.	25VAC
2	14Q7	[illegible]	[illegible]	105VDC	-9VDC§	0V.	-.8VDC	0V.	25VAC
3	14A7	[illegible]	[illegible]	[illegible]	.3VDC	0V.	-.6VDC	3.3VDC	39VAC
4	14B6	[illegible]	[illegible]	[illegible]	0V.	-.8VDC	-.8VDC	0V.	13VAC
5	35L6	[illegible]	[illegible]	85VAC	100VDC	105VDC	0V.	50VAC	6.7VDC
6	35Y4	[illegible]	[illegible]	112VAC	0V.	112VAC	0V.	0V.	116VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	14A7	38Ω	150KΩ	150KΩ	2.7 Meg.	0Ω	3.3 Meg.	0Ω	25Ω
2	14Q7	13Ω	150KΩ	150KΩ	20KΩ	.7Ω	50KΩ	.7Ω	25Ω
3	14A7	52Ω	150KΩ	150KΩ	510Ω	0Ω	2.7 Meg.	10Ω	35Ω
4	14B6	0Ω	420KΩ	5.1 Meg.	0Ω	550KΩ	550KΩ	0Ω	14Ω
5	35L6	0Ω	85Ω	150KΩ	150KΩ	550KΩ	INF.	85Ω	120Ω
6	35Y4	110Ω	108Ω	INF.	INF.	INF.	0Ω	1.1MΩ	85Ω

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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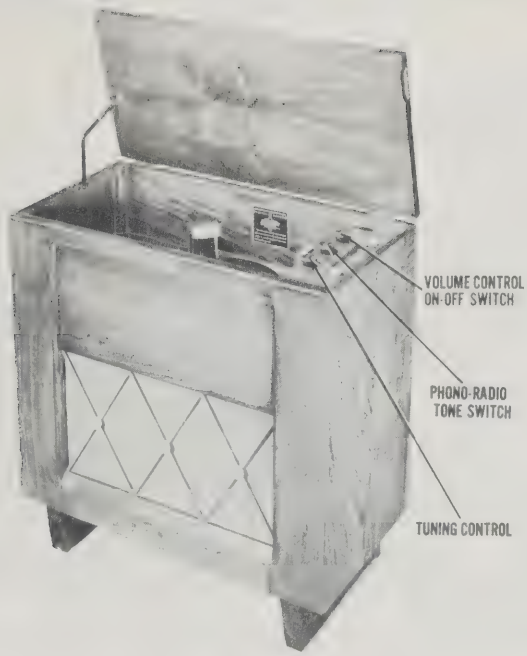
RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of + 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



GENERAL ELECTRIC MODEL 119W

TRADE NAME	General Electric, Models 118, 119M, 119W
MANUFACTURER	General Electric Co., Electronics Dept., Electronics Park, Syracuse, N.Y.
TYPE SET	AC Operated Combination Phono-Radio Superheterodyne Receiver with Loop Antenna
TUBES (SIX)	Types, 12BE6 Converter, 12SK7 IF Amp., 12SQ7 Det.-AVC-AF, 6SC7 Phono Pre-Amp., 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	105-125 Volts AC
TUNING RANGE—BROADCAST	540-1600KC RATING .3 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low freq. end of dial.

Use isolation transformer if available. If not, connect a .1 MFD capacitor in series with low side of signal generator and B-.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.05 MFD	High side to Pin 4 of 12SK7. Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation.
2	.05 MFD	High side to Pin 7 of 12BE6. Low side to B-.	"	"	"	A3,A4	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation. Repeat Steps 1 & 2 until no further improvement can be made. Re-install receiver in cabinet.
3	200 MMFD cap. in series with 470Ω carbon res.	High side to ext. antenna lead. Low side to chassis.	1500KC	1500KC	"	A5	Rock tuning cap. and adjust for maximum output.
4	"	"	"	Tune for maximum output.	"	A6	Rock tuning cap. and adjust for maximum output.

DISASSEMBLY INSTRUCTIONS

1. Remove phono-pickup plug from chassis.
2. Disconnect phono motor plug.
3. Remove speaker plugs from speaker.
4. Remove leads from loop antenna.
5. Remove pilot light socket from bracket at bottom of cabinet.
6. Remove six Phillips head wood screws holding metal chassis cover in cabinet. Lift cover and chassis out top of cabinet.
7. Remove three push-on type control knobs from metal cover. Remove three hex head screws holding chassis to cover. Remove chassis from cover.
8. Remove four hex nuts holding speaker in cabinet. Remove speaker from cabinet.

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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GENERAL ELECTRIC
MODELS 118, 119M, 119W

GENERAL ELECTRIC
MODELS 118, 119M, 119W

PARTS LIST AND DESCRIPTIONS

[illegible] ELECTRIC
[illegible] S 113, 119M, 11.W

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: GENERAL ELECTRIC PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12BE6	12BE6	7CH	
2	IF Amp.	12SK7	12SK7	7N	
3	Det. & AF Amp.	12SQ7	12SQ7	6Q	
4	Phono Pre-Amp.	6SC7	6SC7	6S	
5	Power Output	50L6GT	50L6GT	7AC	
6	Rectifier	35Z5GT	35Z5GT	5AM	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: GENERAL ELECT. PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7A	50	150	RCE-050	PRSA150/50-50	EZ5515	DSB-2x50-150	TA-505	Filter-Red
B	50	150						" "
8	5	150	RCE-056	PRS150/4	BR415	M-8-150	UT-41	Phono Amp. Decoupling
9	.05	600	UCC-045	684-05	DT6S5	ST-6-05	TC-15	Line Filter
10	.003	600	RCC-074	684-003	DT6D3	ST-6-003	TC-23	Output Plate Bypass
11	.01	600	RCC-040	684-01	DT6S1	ST-6-01	TC-11	Audio Coupling
12	.01	400	RCC-032	484-01	DT4S1	ST-4-01	TC-11	" "
13	.01	400	UCC-025	484-01	DT4S1	ST-4-01	TC-11	" "
14	.005	200	RCC-085	484-005	DT6D5	ST-6-005	TC-25	Tone Compensation
15	.003	600	RCC-623	684-003	DT6D3	ST-6-003	TC-23	Tone Compensation
16	.01	600	UCC-040	684-01	DT6S1	ST-6-01	TC-11	Audio Coupling
17	.008	400	RCC-084	484-0075	DT4S1	ST-4-01	TC-11	Tone Compensation
18	.01	200	UCC-008	484-01	DT2S1	ST-4-01	TC-11	Audio Coupling
19	.05	400	UCC-028	484-05	DT4S5	ST-4-05	TC-15	RF Bypass Pwr. Supply
20	.05	400	UCC-028	484-05	DT4S5	ST-4-05	TC-15	AVC Filter
21	.05	400	UCC-028	484-05	DT4S5	ST-4-05	TC-15	Line Isolation
22	.01	600	UCC-040	684-01	DT6S1	ST-6-01	TC-11	Ext. Ant. Coupling
23	220	500	UCU-036	1468-00025	5W5T25	MO.5-325	1FM-325	AF Plate Bypass
24	330	500	UCU-040	1468-00035	5W5T3	MO.5-33	1FM-335	Diode RF Filter
25	47	500	UCU-020	1468-00005	5W5S5	MO.5-45	1FM-45	Osc. Grid Cap.

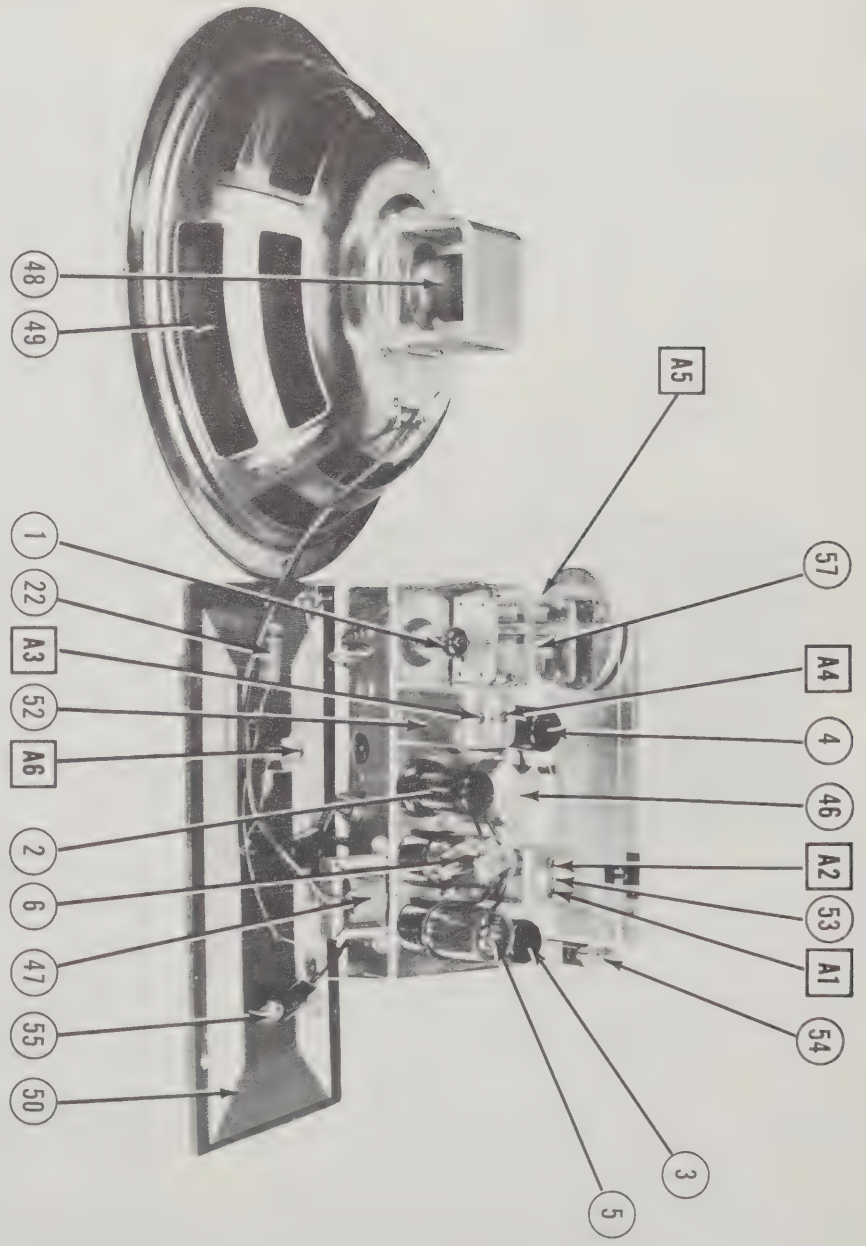
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: GENERAL ELECTRIC PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
26A	2 Meg.	½	RRC-056	D18-136X	AT-116	Volume Control tapped @ 1 Meg.
B	Shaft		Not Req.	E	KSS-3	Attach to 26A per instructions
C	Switch		" "	41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: GENERAL ELECTRIC PART No.	IRC PART No.	IDENTIFICATION CODES
27	2.2Ω	½	URD-001	BTS-22K	Red-Red-Or. Oscillator Grid
28	470KΩ	½	URD-113	BTS-470K	Yl.-Vi.-Yl. Line Isolation
29	68KΩ	½	URD-093	BTS-68K	Blue-Gray-Or. Phono Decoupling
30	2.2 Meg.	½	URD-129	BTS-2.2 Meg.	Red-Red-Grn. AVC Network
31	100KΩ	½	URD-097	BTS-100K	Br.-Blk.-Yl. Tone Compensation
32	27KΩ	½	URD-077	BTS-27K	Red-Vi.-Yl. Diode Load
33	6.8 Meg.	½	URD-129	BTS-6.8 Meg.	Blue-Gray-Grn. AF Grid
34	470KΩ	½	URD-113	BTS-470K	Yl.-Vi.-Yl. AF Plate Load
35	470KΩ	½	URD-113	BTS-470K	Yl.-Vi.-Yl. Output Grid
36	150Ω	½	URD-029	BW-½-150	Br.-Grn.-Br. Output Cathode
37	1200Ω	2	URF-051	BT-2-1200	Br.-Red-Red-Filter
38	18Ω	1	RBW-008	BW-1-18	Br.-Gray-Blk. Surge Limiter
39	3300Ω	½	URD-061	BTS-3300	Or.-Or.-Red Phono Shunt
40	3.3 Meg.	½	URD-133	BTS-3.3 Meg.	Or.-Or.-Grn. 1st Phono Amp. Grid
41	3.3 Meg.	½	URD-133	BTS-3.3 Meg.	Or.-Or.-Grn. 2nd Phono Amp. Grid
42	68KΩ	½	URD-093	BTS-68K	Blue-Gray-Or. 1st Phono Amp. Plate Load
43	68KΩ	½	URD-093	BTS-68K	Blue-Gray-Or. 2nd Phono Amp. Plate Load
44	1.5MΩ	½	URD-153	BTS-1.5M	Brn-Grn-Yl. Tone Compensation
45	2.7MΩ	½	URD-093	BTS-2.7K	Red-Vi.-Or. " "

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	GENERAL ELECTRIC PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
46	117V AC @ .037A	6.2V CT @ .45A			RTR-001		T-21F061	†Drill one new mounting hole.

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		GENERAL ELECTRIC PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
47	2300Ω	3.3Ω	180Ω tapped @ 1.2Ω	.5Ω	RTO-038				

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			GENERAL ELECTRIC PART No.	JENSEN PART No.	QUAM PART No.	
48A B	FIELD	VC IMP.		ST-102*		*Replace output transformer to match 6-8Ω voice coil. Used in Model 118
	PM	3.3Ω	UOP-1247 UOP-557	Mod. P12-S	12A6*	
49	CONE DIA.	VC DIA.				
	11-3/4"	1"				

R F COILS

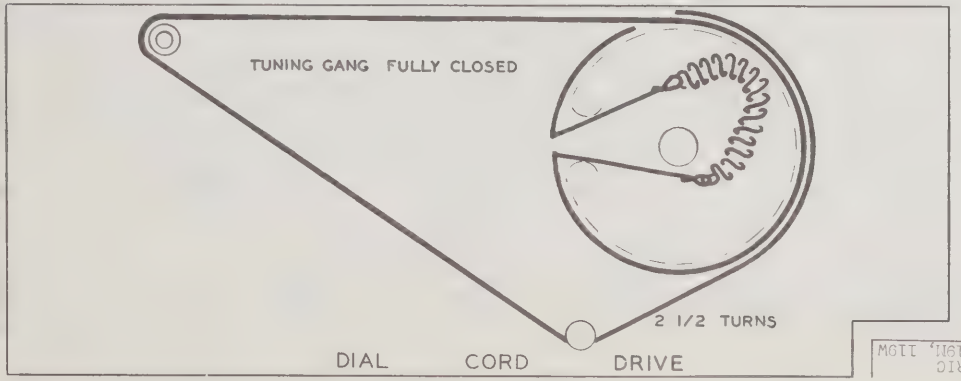
ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	GENERAL ELECTRIC PART No.	MEISSNER PART No.
50	Loop Ant.	.2Ω	2Ω	ALL-026	
51	Osc. Coil	.5Ω	7.6Ω	RLC-001	14-1060
52	Input IF	17Ω	17Ω	RTL-050	16-6658
53	Output IF	23Ω	23Ω	RTL-051	16-6660

DIAL LIGHT

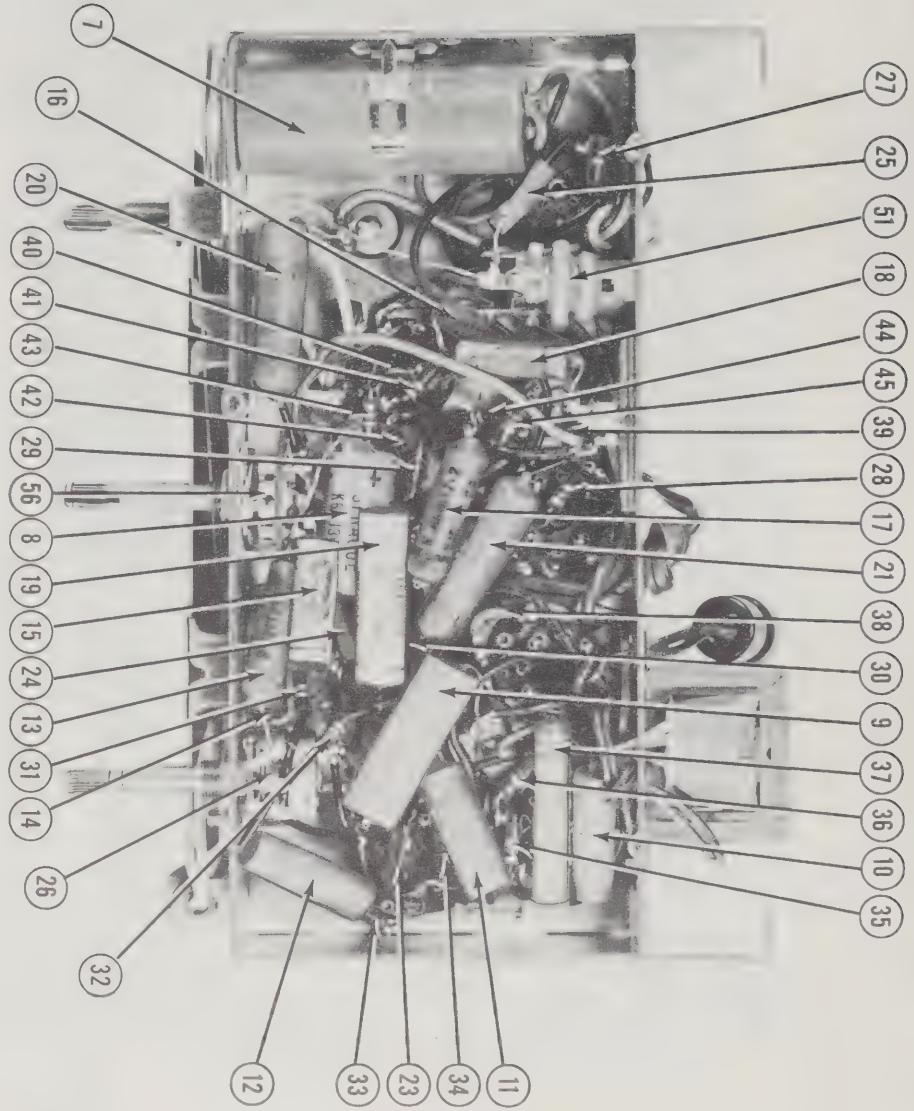
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					GENERAL ELECTRIC PART No.		
54	Bayonet	6-8	0.15	Brown			Type 47
55	"	"	"	"			" "

MISCELLANEOUS

ITEM No.	PART NAME	GENERAL ELECTRIC PART No.	NOTES
56	Switch	RSW-043	Radio-Phono
57	2 Gang Var. Cap.	RCT-026	(12-442MMF, 23-152MMF)
	Dial Scale	RDS-055	
	Dial Pointer	RDX-033	
	Knob	RDK-036	Plain
	"	RDK-039	With Arrow



CHASSIS—BOTTOM VIEW



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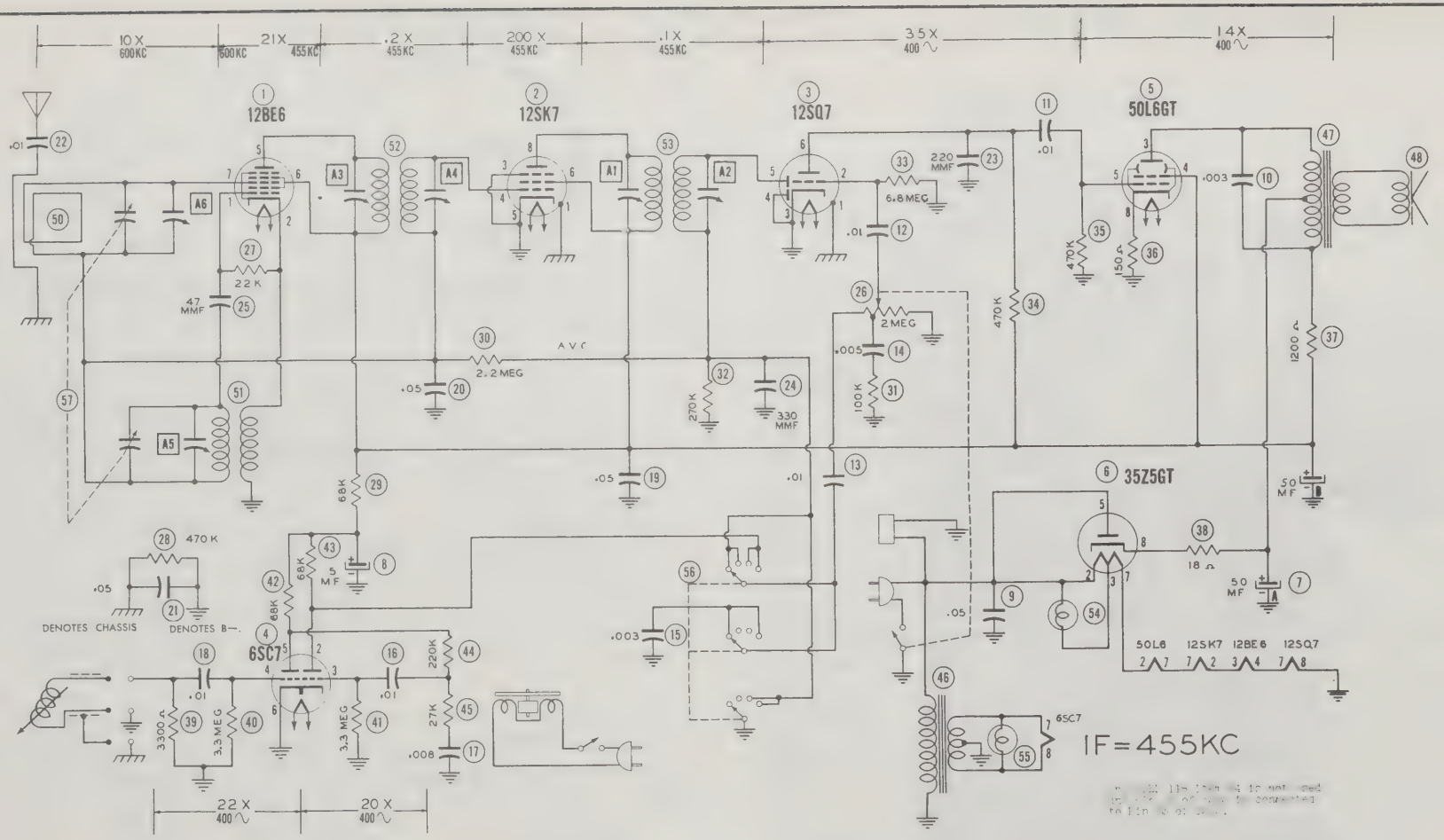
GENERAL ELECTRIC MODELS 118, 119N, 119W



RADIO-PHONO SWITCH IN RADIO POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	92VDC	92V.	[illegible]	–
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0V.	92VDC	[illegible]	92VDC
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	−.4VDC	80VDC	[illegible]	0V.
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.1VAC	3.1VAC
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	117VAC	[illegible]	[illegible]	117VAC	125VDC	85VAC	130VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12BE6	22KΩ	.5Ω	22Ω	12Ω	1.0KΩ	15 MΩ	2.4 Meg.	–
2	12SK7	470KΩ	22Ω	0Ω	2.4 Meg.	0Ω	150KΩ	34Ω	150KΩ
3	12SQ7	470KΩ	6.8 Meg.	0Ω	0Ω	270KΩ	220KΩ	12Ω	0Ω
4	6SC7	470KΩ	280KΩ	3.3 Meg.	3.3 Meg.	280KΩ	0Ω	1Ω	1Ω
5	50L6GT	INF.	70Ω	150KΩ	150KΩ	470KΩ	0Ω	34Ω	150Ω
6	35Z5GT	INF.	90Ω	85Ω	150KΩ	90Ω	150KΩ	70Ω	150Ω

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. **DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.**
2. **Socket connections are shown as bottom views.**
3. **Measured values are from socket pin to common negative.**
4. **Line voltage maintained at 117 volts for voltage readings.**
5. **Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.**
6. **Volume control at maximum, no signal applied for voltage measurements.**

GENERAL TELEVISION
MODEL 9A5

GENERAL TELEVISION
MODEL 9A5

GENERAL TELEVISION MODEL 9A5

TRADE NAME	General Television Model 9A5
SUPPLIER	General Television & Radio Corp., 2701 Lehmann St., Chicago, Ill.
TYPE SET	AC-DC Operated Superheterodyne Receiver - Self Contained Loop Antenna
TUBES (FIVE)	Types, 12SA7GT Converter, 12SK7GT IF Amp., 12SQ7GT Det.-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	110-120 Volts AC-DC
TUNING RANGE—BROADCAST	540-1720KC

RATING .245 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn tuning cap fully closed and set pointer to last reference mark at low freq. end of dial. Use isolation transformer if available. If not, connect a capacitor in series with low side of signal generator and chassis. Volume should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to rear stator of tuning cap. Low side to chassis.	455KC	Tuning cap. open.	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy ant. to .001 MFD. to reduce hum modulation.
2		Loop	1600KC	1600KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1400KC	Tune for maximum output.	"	A6	"

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PARTS LIST AND DESCRIPTIONS

GENERAL TELEVISION
U. S. A.

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: GENERAL TELE. PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12SA7GT	12SA7GT	6AD	
2	IF Amp.	12SK7GT	12SK7GT	6K	
3	Det.-AVC-AF	12SQ7GT	12SQ7GT	6Q	
4	Power Output	50L6GT	50L6GT	7AC	
5	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: GENERAL TELE. PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SPRAGUE PART No.	SOLAR PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	40	150	8-1	AF88D	UP4215	EL-24	DY-4020-150	■ Filter
*	20	150						▲ Filter
7	.1	200		484-.1	DT4P1	TC-1	ST-4-1	Line Filter
8	.02	400		484-02	DT4S2	TC-12	ST-4-02	Output Plate Bypass
9	.01	400		484-01	DT4S1	TC-11	ST-4-01	Audio Coupling
10	.01	400		484-01	DT4S1	TC-11	ST-4-01	"
11	.05	200		484-05	DT4S5	TC-15	ST-4-05	AVC Filter
12	250	500		1468-00025	5W5T25	1FM-325	MO.5-325	Audio Plate Bypass
13	100	500		1468-0001	5W5T1	1FM-31	MO.5-31	IF Bypass Vol. Cont.
14	100	500		1468-0001	5W5T1	1FM-31	MO.5-31	OSc. Grid Capacitor

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: GENERAL TELE. PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
15A	500KΩ	1	20-1	D13-133	M-60-2	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 15A per instructions
C	Switch		" "	41	SW-A	" " " " "

RESISTORS

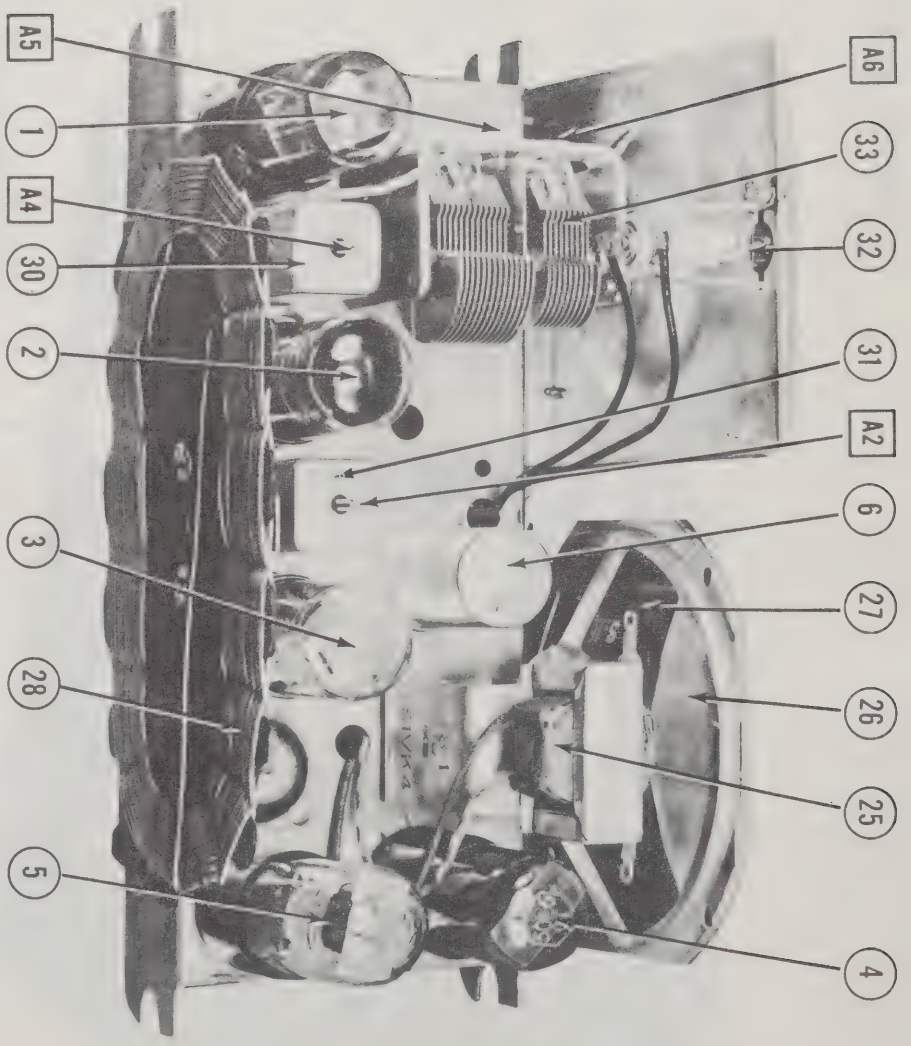
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: GENERAL TELE. PART No.	IRC PART No.	IDENTIFICATION CODES
16	20kΩ	¼		BTS-22K	Red-Blk.-Or. Oscillator Grid
17	10 Meg.	¼		BTS-10 Meg.	Br.-Blk.-Blue AVC Network
18	1 Meg.	¼		BTS-1 Meg.	Br.-Blk.-Grn. AVC Network-See Note
19	6 Meg.	¼		BTS-5.6 Meg.	Blue-Blk.-Grn. AF Grid
20	500KΩ	¼		BTS-470K	Grn.-Blk.-Yl. AF Plate Load
21	500KΩ	¼		BTS-470K	Grn.-Blk.-Yl. Output Grid
22	150Ω	¼		BW-½-150	Br.-Grn.-Br. Output Cathode
23	2000Ω	1		BTA-2200	Red-Blk.-Red Filter
24	10Ω	¼		BW-½-10	Br.- Blk.-Blk.- Line Dropping

Note- Some models use 2 Meg. in this application. IRC replacement BTS 2.2 Meg.

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: GENERAL TELE. PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
25	2400Ω	3.2Ω	150Ω	.2Ω	Part of 8-1	A-3746*	T22S45*	A-2928*	*Bend mounting tabs down, file out slots and mount on original bracket.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: GENERAL TELE. PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.		ST-105‡		‡Drill and tap magnet frame.
26	PM	3.2Ω	9-1	Mod. P5-X	5A07§	§Drill new mounting holes.
	CONE DIA.	VC DIA.				
27	4-3/8"	1/2"				

R F COILS

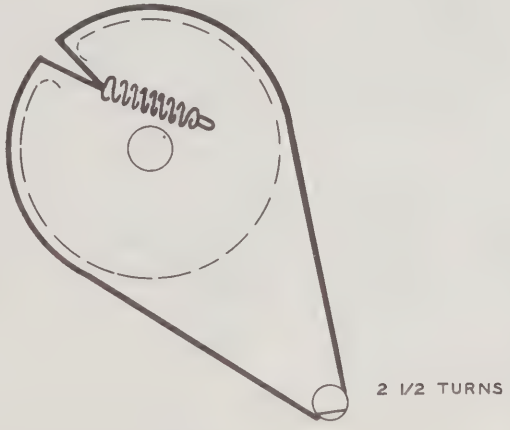
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: GENERAL TELE. PART No.	REPLACEMENT DATA: MEISSNER PART No.
28	Loop Ant.		1.2Ω	32-5	
29	Osc. Coil	1Ω	6Ω	14-1	14-1040
30	Input IF	10.5Ω	10Ω	15-3	15-5668
31	Output	10.5Ω	10.5Ω	15-3	15-5669

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: GENERAL TELE. PART No.	REPLACEMENT DATA	INSTALLATION NOTES
32	Bayonet	6-8	0.15	Brown			Type 47

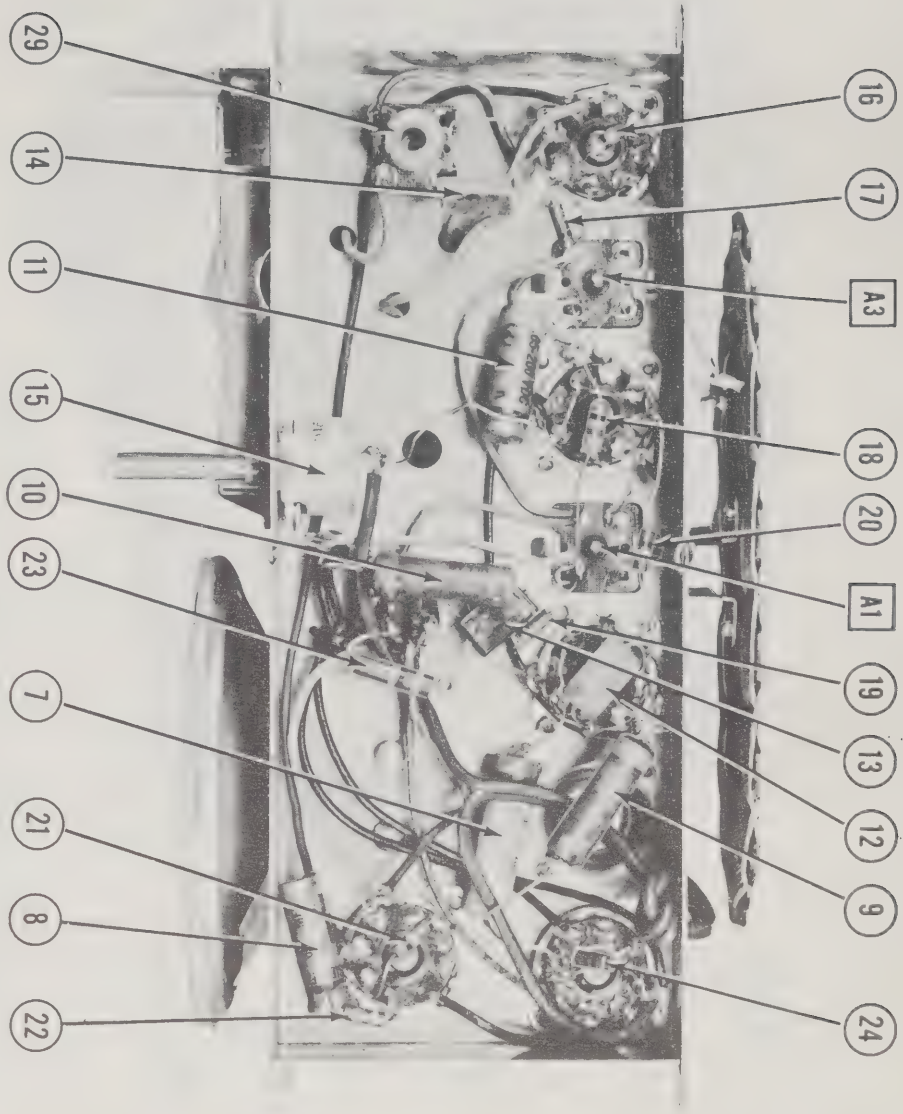
MISCELLANEOUS

ITEM No.	PART NAME	GENERAL TELE. PART No.	NOTES
33	2 Gang Var.Cap.	6-1	28-474 MMF, 32-195 MMF

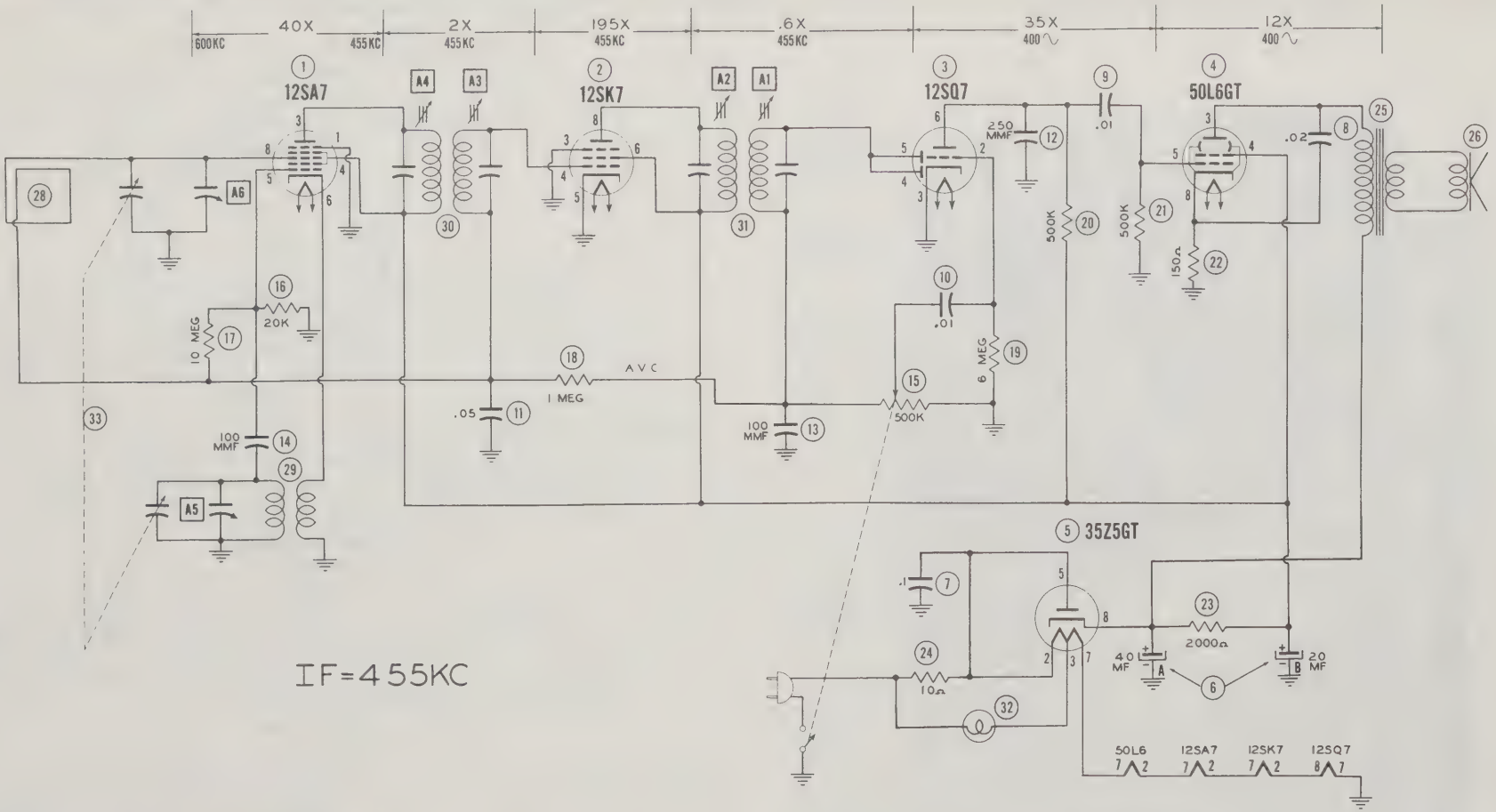


DIAL CORD DRIVE

CHASSIS—BOTTOM VIEW



GENERAL TELEVISION MODEL 8A5



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1								57VAC	-.03VDC
2								25VAC	92VDC
3									
4				128VDC	92VDC	0V.	0V.	88VAC	5.9VDC
5			117VAC	118VAC	0V.	117VAC	117VAC	93VAC	1.85VDC

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7GT		.4			1			
2	12SK7GT	0Ω	12Ω	0Ω	1.1 Meg.	0Ω	95kΩ		
3	12SQ7GT	0Ω	4 Meg.	0Ω	480kΩ	480kΩ	700kΩ		
4									
5						10kΩ			

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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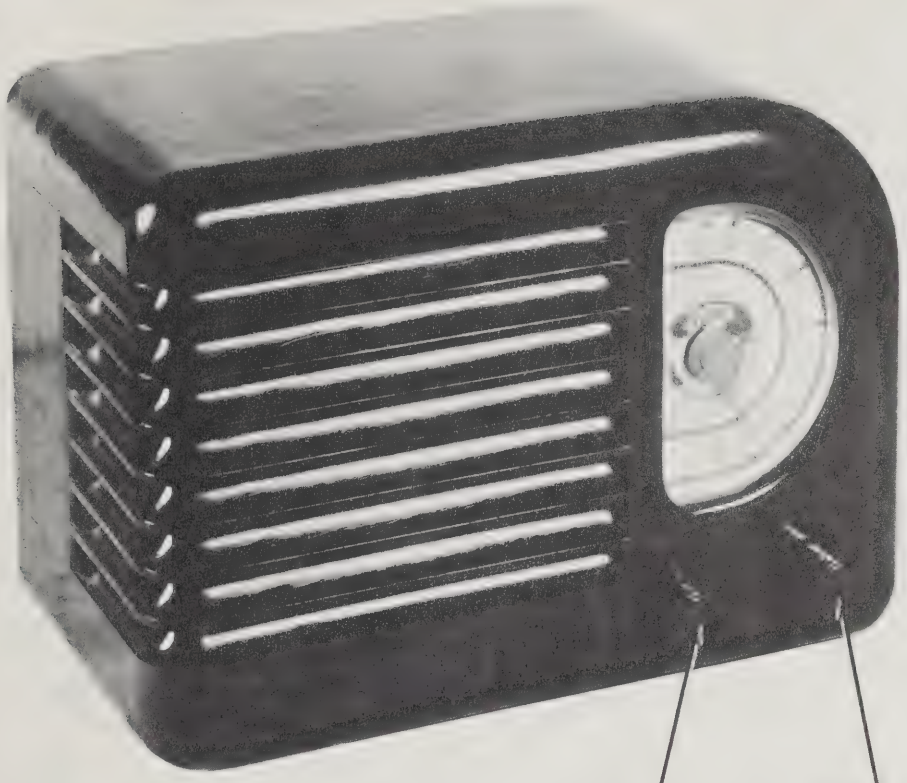
The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

GLOBE MODEL
457



GLOBE MODEL
457

GLOBE MODEL 457

TRADE NAME	Globe, Model 457
MANUFACTURER	Globe Electronics Inc., 225 W. 17th St., New York, N.Y.
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (FOUR)	Types, 12SA7 Converter, 12SQ7 Det.-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	110-120 Volts AC-DC
TUNING RANGE—BROADCAST	540-1620KC RATING .25 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer parallel to side of dial. Use isolation transformer if available. If not, connect a .1 MFD capacitor in series with low side of signal generator and chassis.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to rear stator of tuning cap. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD to reduce hum modulation.
2	200MMFD	High side to junction of ant. hank and antenna coil (32). Low side to chassis.	1500KC	1500KC	"	A3	Adjust for maximum output.
3	200MMFD	"	1400KC	Tune for maximum output.	"	A4	" " " "

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		GLOBE PART No.	STANDARD REPLACEMENT		
1	Converter	12SA7	12SA7	8R	
2	Det.-AVC-AF	12SQ7	12SQ7	8Q	
3	Power Output	50L6GT	50L6GT	7A	
4	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	GLOBE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
5A	50	150		PRSA150-30-50	EDL5315	DSB-5030-150	TA-530	Filter-Com.
B	30	150						Cathode Bypass-Red
6	30	150		PRS150-30	BR3015	M-30-150	UT-301	Filter
7	.02	600		684-02	DT6S2	ST-6-02	TC-12	Line Filter
8	.02	600		684-02	DT6S2	ST-6-02	TC-12	Output Plate Bypass
9	.01	200		484-01	DT2S1	ST-4-01	TC-11	Audio Coupling
10	.01	200		484-01	DT2S1	ST-4-01	TC-11	Conv. Cathode Bypass
11	.05	400		484-05	DT4S5	ST-4-05	TC-15	AVC Filter
12	250	500		1468-00025	5W5T25	MO.5-325	1FM-325	AF Plate Bypass
13	2500	500		1467-0025	1W5DT25	MW.5-225	1FM-25	Audio Coupling
14	250	500		1468-00025	5W5T25	MO.5-325	1FM-325	Diode RF Filter
15	250	500		1468-00025	5W T25	MO.5-325	1FM-325	Osc. Grid Cap.
16	50	500		1468-00005	5W5Q5	MO.5-45	1FM-45	Conv. Plate Bypass
17	6000	500		1467-006	1D5D6	MW.5-26	1FM-26	Ext. Ant. Isolation

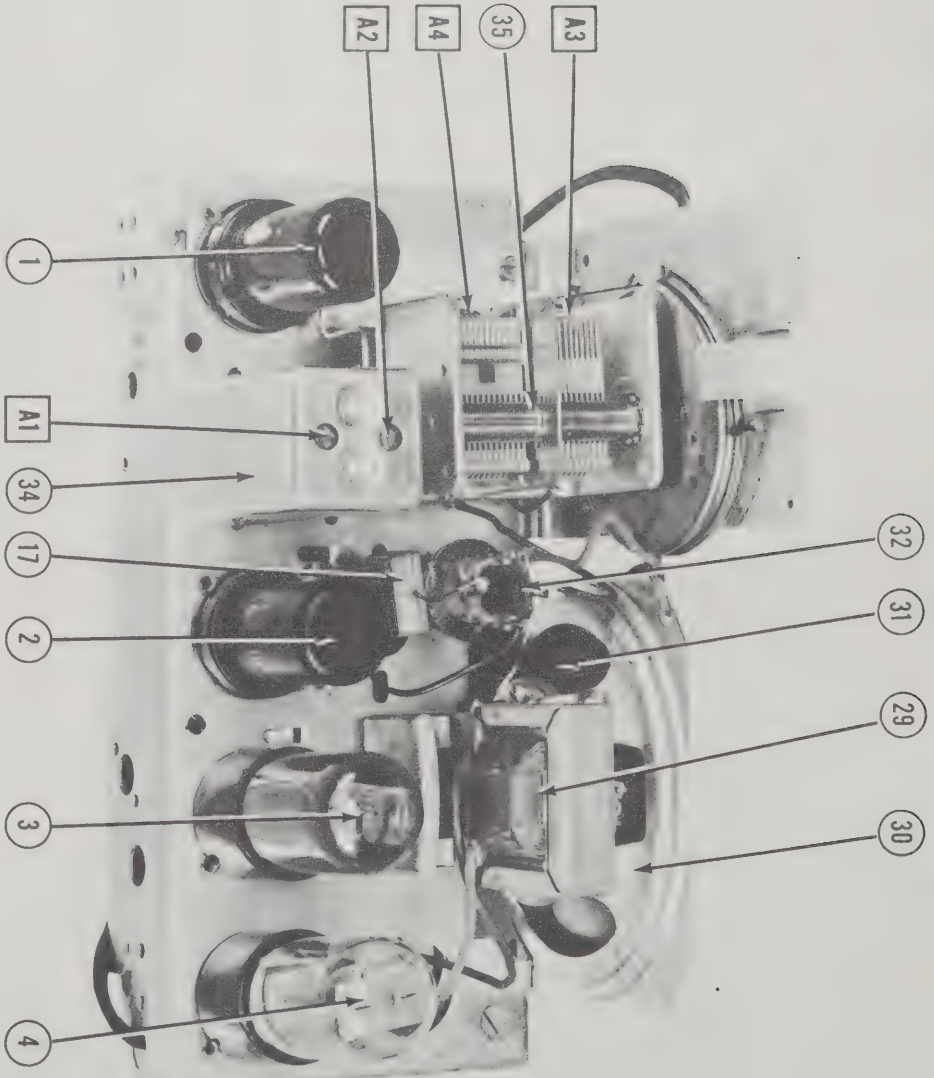
CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	GLOBE PART No.	IRC PART No.	CLAROSTAT PART No.	
18A	500KΩ	½		D13-133	AM-60-Z	Volume Control
B	Shaft			E	KS5-3	Attach to 18A per instructions
C	Switch			41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	GLOBE PART No.	IRC PART No.	
19	22KΩ	½		BTS-22K	Red-Red-Or. Oscillator Grid
20	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue AVC Network
21	10 Meg..	½		BTS-10 Meg.	Br.-Blk.-Blue AF Grid
22	470KΩ	½		BTS-470K	Y1.-V1.-Y1. AF Plate Load
23	470KΩ	½		BTS-470K	Y1.-V1.-Y1. Output Grid
24	150Ω	2		BW-2-150	Br.-Blk.-Br. Output Cathode
25	1200Ω	1		BTA-1200	Br.-Br.-Red Filter
26	220Ω	1		BW-1-220	Red-Blk.-Br. Line Dropping
27	220Ω	1		BW-1-220	Red-Blk.-Br. " "
28	56Ω	½		BW-½-56	Gr.-Blu.-Blk. Converter Cathode

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		GLOBE PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
29	1700Ω	3.2Ω	180Ω	.8Ω	Part of 6807	A-3876*	T2284*	A-2928*	*Bend mounting tabs down, file out slots and mount on original bracket.

SPEAKER

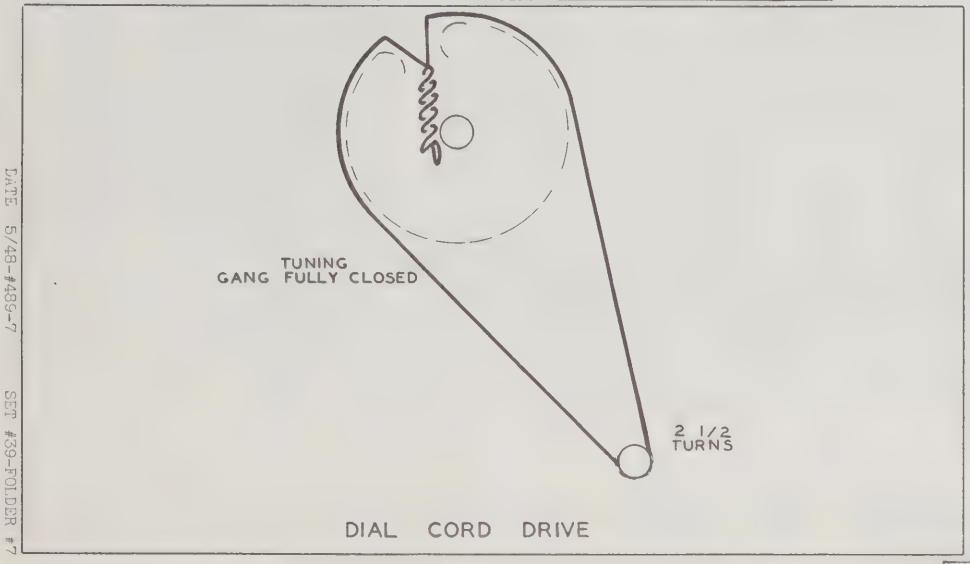
ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			GLOBE PART No.	JENSEN PART No.	QUAM PART No.	
30	FIELD PM	VC IMP. 3.2Ω	6867	ST-113 Mod. P4-X	4A07	
31	CONE DIA. 4"	VC DIA. 1/2"	CONE HAS SPECIAL ADJUSTMENT FEATURE- ORDER FROM MANUFACTURER			

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	GLOBE PART No.	MEISSNER PART No.
32	Ant. Coil	30Ω	5Ω		14-1060
33	Osc. Coil		4.5Ω		14-1060
34	IF Trans.	14Ω	14Ω		16-6660

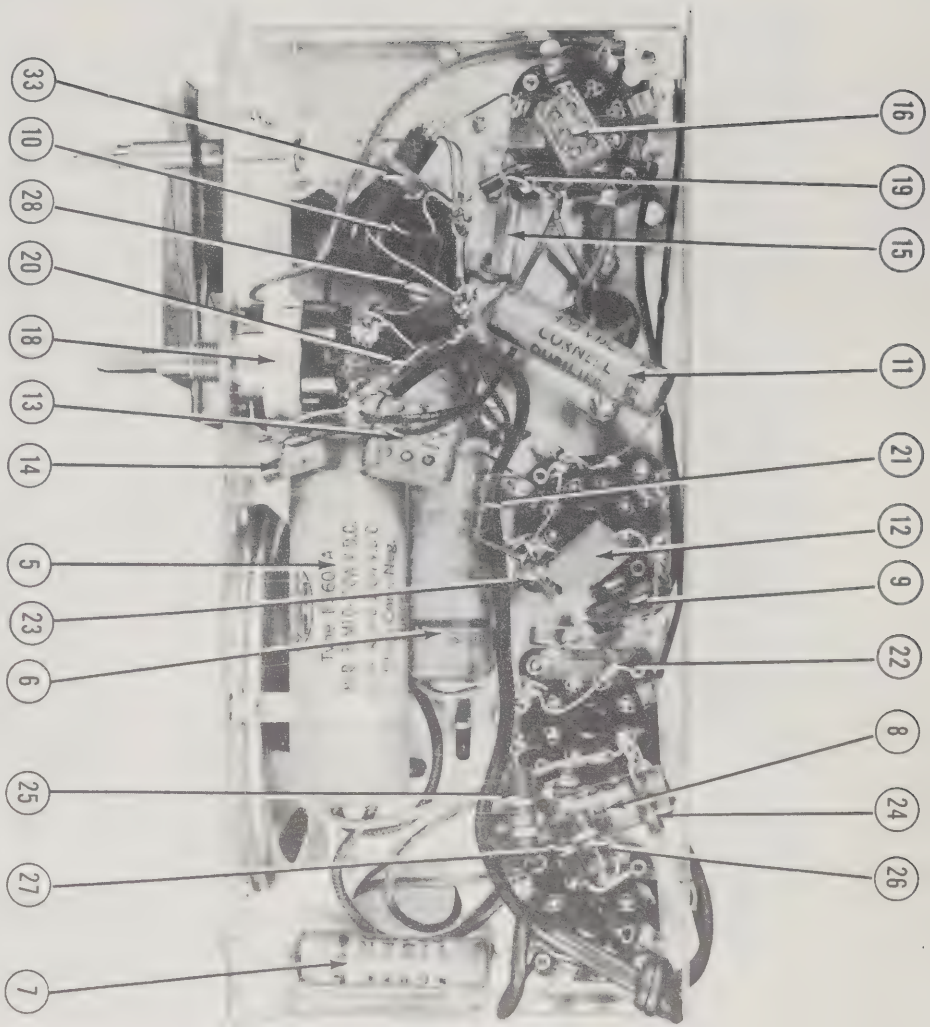
MISCELLANEOUS

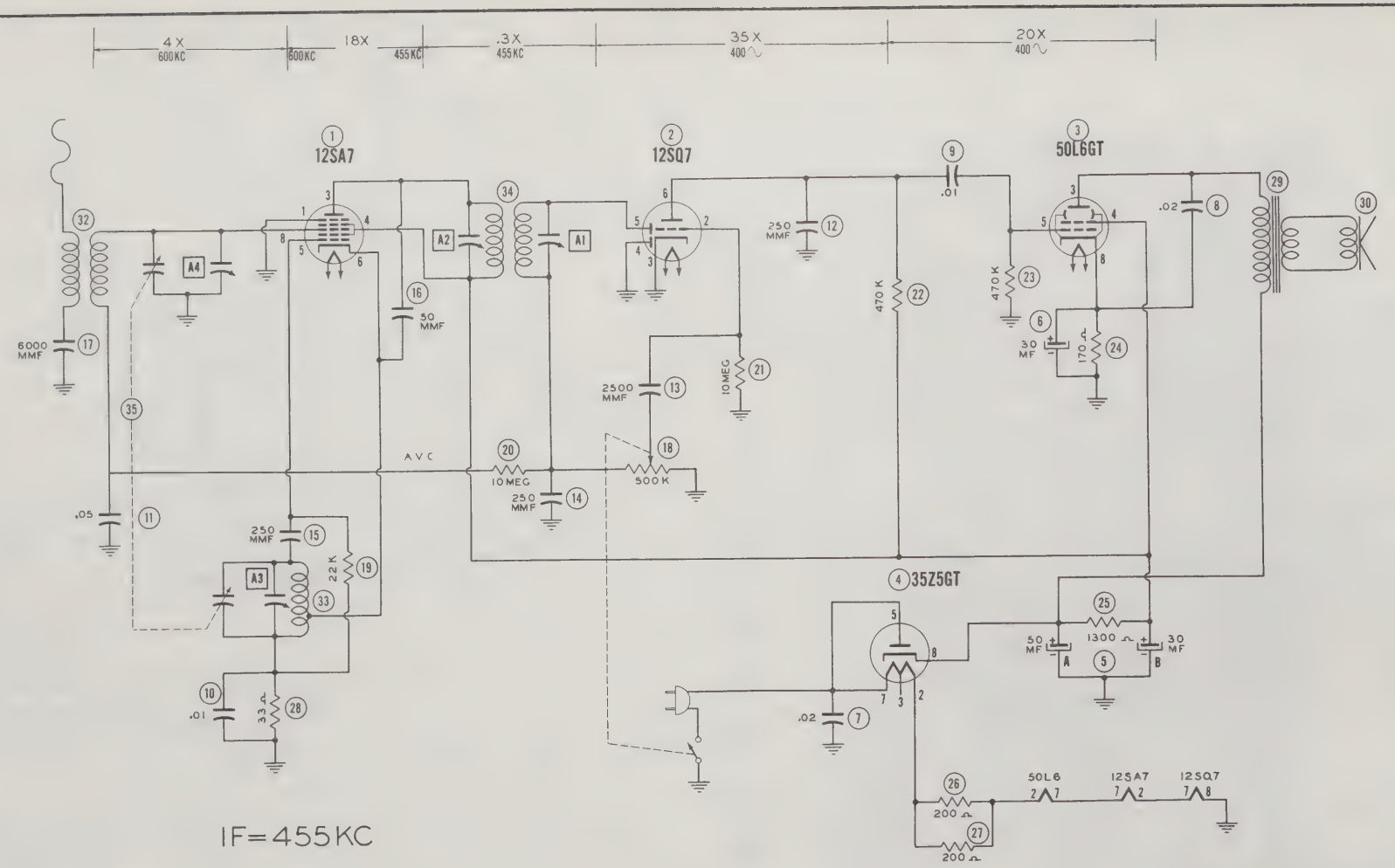
ITEM No.	PART NAME	GLOBE PART No.	NOTES
35	2 Gang Var. Cap.		(38-485MMF, 34-[illegible]MMF)



DIAL CORD DRIVE

CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1							.4VDC	23VAC	0V.
2							62VDC	11VAC	0V.
3									
4									

TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	0Ω	12Ω	30KΩ	30KΩ	22KΩ	34Ω	25Ω	10 Meg.
2	12SQ7	0Ω	10 Meg.	0Ω	0Ω	500KΩ	500KΩ	12Ω	0Ω
3	50L6	INF.			30KΩ	30KΩ	470KΩ	INF.	25Ω	170Ω
4	35Z5	INF.				INF.	220Ω	INF.	220Ω	30KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of + 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

HALLICRAFTERS
MODEL S-53

HALLICRAFTERS MODEL S-53

TRADE NAME	Hallicrafters, Model S-53
MANUFACTURER	Hallicrafters Co., 5th & Kostner, Chicago, Ill.
TYPE SET	AC Operated Multi-Band Superheterodyne Receiver
TUBES (EIGHT)	Types, 6BA6 Mixer, 6C4 Osc., 6BA6 1st IF Amp., 6BA6 2nd IF Amp., 6H6 Noise Limiter-Detector, 6SC7 AF Amp.-BFO, 6K6GT Power Output, 5Y3GT Rectifier.
POWER SUPPLY	105-125 Volts AC RATING .45 Amp. @ 117 Volts AC
TUNING RANGE -	Band "A" - 550-1650KC, Band "B" - 2.6-6.1MC, Band "C" - 6.2-17MC, Band "D" - 14-32MC. Band "E" - 48-55MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning caps. fully closed and set pointers to last reference marks of their respective dials.

Band spread pointer must be set at 100 for Bands A, B, C and D. For Band E turn main tuning cap. fully open and use band spread tuning cap. Set noise limiter to "Off", standby-receive switch to "Receive", "CW-AM" switch to "AM", sensitivity control to fully clockwise and tone switch to "HI". Volume control should be at maximum position and output of signal generator no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for all adjustments.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to front stator of tuning cap. Low side to chassis.	2.075MC	A	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4, A5,A6, A7,A8.	Adjust for maximum output.
2	.1 MFD.	"	2.075MC (unmodulated)	"	"	"	A9	Adjust for approximate 1000∿ beat note.
3	300Ω carbon resistor	High side to ant. terminal A1. Low side to A2 with link connected.	1500KC	"	1500KC	"	A10	Adjust for maximum output.
4	"	"	"	"	Tune for maximum output.	"	A11	" " " "
5	"	"	600KC	"	600KC	"	A12	Rock tuning cap. and adjust for maximum output. Repeat Steps 2, 3 and 4 until no further improvement can be made.
6	"	"	6MC	B	6MC	"	A13	Adjust for maximum output.
7	"	"	"	"	Tune for maximum output.	"	A14	" " " "
8	"	"	15MC	C	15MC	"	A15	" " " "
9	"	"	"	"	Tune for maximum output.	"	A16	Rock tuning cap. and adjust for maximum output.
10	"	"	30MC	D	30MC	"	A17	Adjust for maximum output.
11	"	"	"	"	Tune for maximum output.	"	A18	Rock tuning cap. and adjust for maximum output.
12	"	"	52MC	E	52MC	"	A19	Adjust for maximum output.
13	"	"	"	"	Tune for maximum output.	"	A20	Rock tuning cap. and adjust for maximum output.

A21 is a wave trap to be adjusted to minimize interference caused by stations in Band E. Rock tuning cap. across interfering signal and adjust A21 for point of least interference.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: HALLICRAFTERS PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Mixer	6BA6	6BA6	7MK	
2	Osc.	6C4	6C4	5G	
3	1st IF Amp.	6BA6	6BA6	7MK	
4	2nd IF Amp.	6BA6	6BA6	7MK	
5	Noise Limiter-Det.	6H6	6H6	7S	
6	AF Amp.-BFO	6SC7	6SC7	8S	
7	Power Output	6K6GT	6K6GT	7S	
8	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

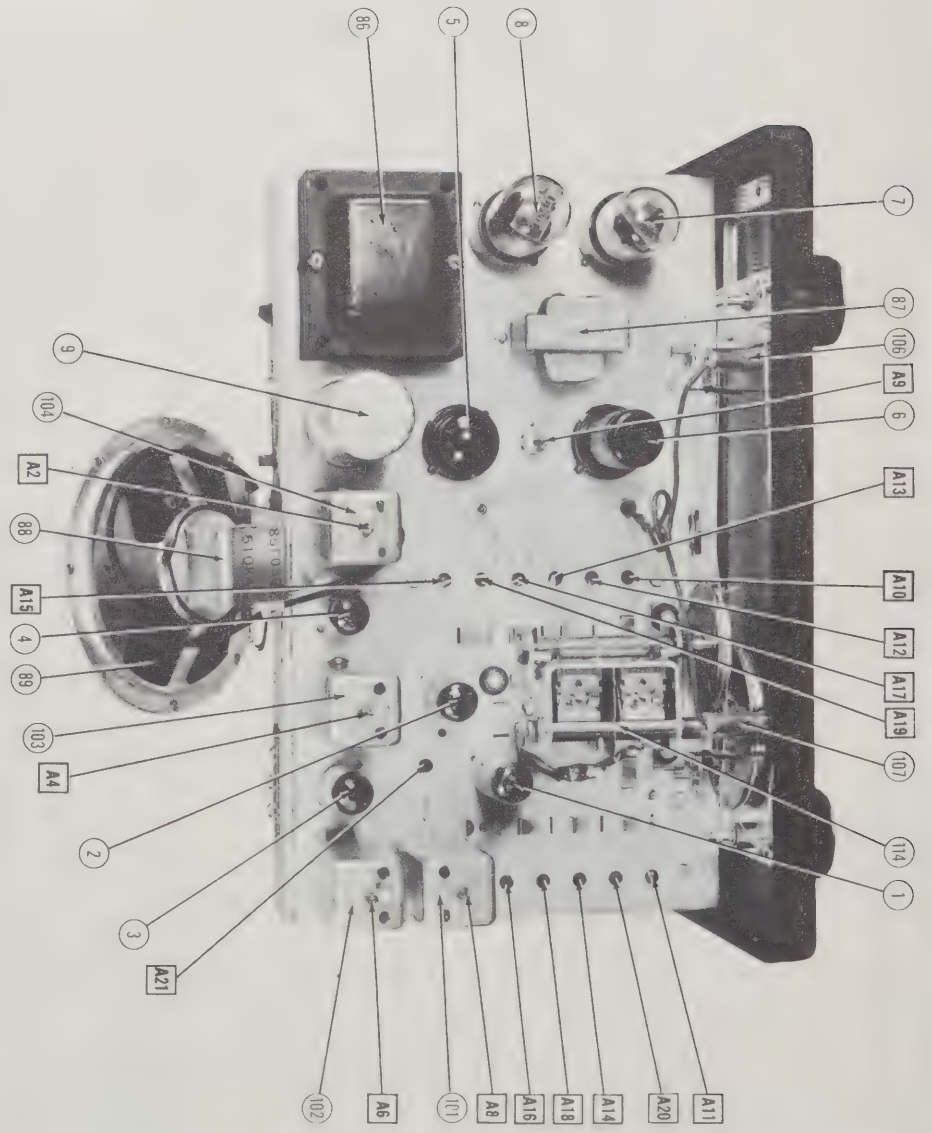
Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: HALLICRAFTERS PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
9A	50	350	45D122A			DY-402	EL-424	◆ Filter
B	10	350				M-40-450		■ "
C	10	350						▲ "
D	10	25						Cathode Bypass
10	.01	400	46AB103J	484-01	DT4S1	MPH-4-01	TC-11	Line Filter
11	.02	600	46AY203J	684-02	DT6S2	ST-6-02	TC-12	Tone Compensation
12	.01	600	46AZ103J	684-01	DT6S1	ST-6-01	TC-11	Output Plate Bypass
13	.01	600	46AZ103J	684-01	DT6S1	ST-6-01	TC-11	Audio Coupling
14	.01	600	46AZ103J	684-01	DT6S1	ST-6-01	TC-11	BFO Feedback
15	.003	600	46AZ302J	684-003	DT6D3	ST-6-003	TC-23	Audio Coupling
16	.01	600	46AZ103J	684-01	DT6S1	ST-6-01	TC-11	" "
17	.01	600	46AZ103J	684-01	DT6S1	ST-6-01	TC-11	" "
18	.05	400	46AW503J	484-05	DT4S5	ST-4-05	TC-15	Noise Lim. Filter
19	.05	400	46AW503J	484-05	DT4S5	ST-4-05	TC-15	2nd IF Decoupling
20	.01	600	46AZ103J	684-01	DT6S1	ST-6-01	TC-11	2nd IF Screen Bypass
21	.02	600	46AY203J	684-02	DT6S2	ST-6-02	TC-12	2nd IF Cathode Bypass
22	.01	600	46AZ103J	684-01	DT6S1	ST-6-01	TC-11	AVC Filter
23	.01	600	46AZ103J	684-01	DT6S1	ST-6-01	TC-11	1st IF Screen Bypass
24	.02	600	46AY203J	684-02	DT6S2	ST-6-02	TC-12	1st IF Cathode Bypass
25	.1	200	46AU104J	484-.1	DT2P1	ST-2-1	TC-1	RF Bypass
26	.01	600	46AZ103J	684-01	DT6S1	ST-6-01	TC-11	AVC Filter
27	.05	400	46AW503J	484-05	DT4S5	ST-4-05	TC-15	RF Bypass Pwr. Supply
28	5000	450	47A166	1467-005	1D5D5	MW.5-25	1FM-25	Filament Bypass-Cer.
29	470	500	CM20A4715	1468-0005	5W5T3	MO.5-35	1FM-35	BFO Fixed Trimmer
30	100	500	47A086	1468-0001	5W5T1	MO.5-31	1FM-31	BFO Grid Cap.-Cer.
31	220	500	CM20A221K	1468-00025	5W5T25	MO.5-325	1FM-325	AF Plate Bypass
32	50	500	47A091	1468-00005	5W5Q5	MO.5-45	1FM-45	Diode RF Filter-Cer.
33	50	500	47A091	1468-00005	5W5Q5	MO.5-45	1FM-45	" " " "
34	2.2		47A160-4					IF Coupling-Cer.
35	5000	450	47A168	1467-005	1D5D5	MW.5-25	1FM-25	Mixer Screen Bypass-Cer.
36	5000	450	47A168	1467-005	1D5D5	MW.5-25	1FM-25	Mixer Cathode Bypass-Cer.
37	100	500	47A086	1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Coupling-Cer.
38	500	500	CM20C501G	1469-0005	5W5T5	MOS.5-35	MS-35	Fixed Pad
39	1000	500	CM20C102G	1464-001	1W5D1	MWS.5-21	MS-21	" "
40	4700	500	CM35A472K					" "
41	100	500	47A086	1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Cap.-Cer.
42	2.2		47A160-4					Osc. Coupling -Cer.
43	220	500	CM20A221K	1468-00025	5W5T25	MO.5-325	1FM-325	RF Coupling
44	5	300	47A160-6	1469-000005	5W5V5	MO.5-55	MS-55	RF Bypass-Cer.
45	5	300	47A160-6	1469-000005	5W5V5	MO.5-55	MS-55	Fixed Trimmer-Cer.
46	5	300	47A160-6	1469-000005	5W5V5	MO.5-55	MS-55	RF Bypass-Cer.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: HALLICRAFTERS PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
47A	2 Meg.	½	25B602	D18-139	M-66-Z	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 47A per instructions
C	Switch		" "	41	SW-A	" " " " "
48A	10KΩ	½	25B603	D16-116	M-30-V	Sensitivity Control
B	Shaft		Not Req.	A	Not Req.	Attach to 48A per instructions
C	Switch		" "	43	SW-A1	" " " " "

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	HALLICRAFTERS PART No.	IRC PART No.	
49	1.8 Meg.	½	RC20AE185M	BTS-1.8 Meg.	Br.-Gray-Grn. Mixer Grid
50	2200Ω	½	RC20AE222M	BTS-2200	Red-Red-Red Mixer Cathode
51	27Ω	½	RC30AE270M		Red-Violet-Blk. Parasitic Suppressor
52	330KΩ	½	RC20AE334K	BTS-330K	Or.-Or.-Yl. Mixer Screen
53	10KΩ	1	RC30AE103K	BTA-10K	Br.-Blk.-Or. Plate
54	27Ω	½	RC20AE270M		Red-Violet-Blk. Parasitic Suppr.
55	4700Ω	½	RC20AE472K	BTS-4700	Yl.-Violet-Red Osc. Coil Shunt
56	10KΩ	½	RC20AE103K	BTS-10K	Br.-Blk.-Or. Osc. Coil Shunt
57	4700Ω	½	RC20AE472K	BTS-4700	Y..-Violet-Red Osc. Coil Shunt
58	20KΩ	½	RC20AE203M	BTS-20K	Red-Blk.-Or. Osc. Grid
59	470KΩ	½	RC20AE474M	BTS-470K	Yl.-Violet-Yl. AVC Network
60	680Ω	½	RC20AE681K	BTS-680	Blue-Gray-Br. Antenna Coil Shunt
61	1000Ω	½	RC20AE102M	BTS-1000	Br.-Blk.-Red 1st IF Screen Decoup.
62	100Ω	½	RC20AE101K	BW-½-100	Br.-Blk.-Br. 1st IF Cathode
63	100Ω	½	RC20AE101K	BW-½-100	Br.-Blk.-Br. 2nd IF Cathode
64	22KΩ	½	RC20AE223M	BTS-22K	Red-Red-Or. Screen Dropping
65	1000Ω	1	RC30AE102M	BTA-1000	Br.-Blk.-Red 2nd IF Decoupling
66	1.8 Meg.	½	RC20AE185M	BTS-1.8 Meg.	Br.-Gray-Grn. AVC Network
67	47KΩ	½	RC20AE473M	BTS-47K	Yl.-Violet-Or. RF Diode Filter
68	100KΩ	½	RC20AE104K	BTS-100K	Br.-Blk.-Yl. Diode Load
69	330KΩ	½	RC20AE334K	BTS-330K	Or.-Or.-Yl. " "
70	1 Meg.	½	RC20AE105M	BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
71	470KΩ	½	RC20AE474M	BTS-470K	Yl.-Vi.-Yl. Noise Lim. Network
72	2.7 Meg.	½	RC20AE275M	BTS-2.7 Meg.	Red-Violet-Grn. Noise Lim. Diode Load
73	470KΩ	½	RC20AE474M	BTS-470K	Yl.-Violet-Yl. Phono Shunt
74	120Ω	½	RC20AE121M	BW-½-120	Br.-Red-Br. AVC Shunt
75	20KΩ	½	RC20AE203M	BTS-20K	Red-Blk.-Or. Pre-Amp Plate
76	47KΩ	½	RC20AE473M	BTS-47K	Yl.-Violet-Or. BFO Grid
77	220KΩ	½	RC20AE224K	BTS-220K	Red-Red-Yl. 1st Audio Plate
78	15 Meg.	½	RC20AE156K	BTS-15 Meg.	Br.-Grn.-Blue 1st Audio Grid
79	470KΩ	½	RC20AE474M	BTS-470K	Yl.-Violet-Yl. Output Grid
80	680Ω	½	RC20AE681K	BTS-680	Blue-Gray-Br. Output Cathode
81	1000Ω	½	RC20AE102M	BTS-1000	Br.-Blk.-Red Tone Comp.
82	15Ω	½	RC20AE150M	BW-½-15	Br.-Grn.-Blk. Headphone Shunt
83	680Ω	2	RC40AE681M	DT-2-680	Blue-Gray-Br. Filter
84	1000Ω	1	RC30AE102M	BTA-1000	Br.-Blk.-Red "
85	0.6Ω	1	RC30AE000K	BW-1-0.6	Blue-Gray-Grn. Filament Dropping

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	HALLICRAFTERS PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
86	117V AC @ .45A	460V CT @ .06A	5V AC @ 3.0A	6.4V AC @ 2.6A	52C164	P-6011‡#	T-22R02‡	P-2151‡

‡Drill new mounting holes.
#Use series dropping resistor to reduce plate voltage.

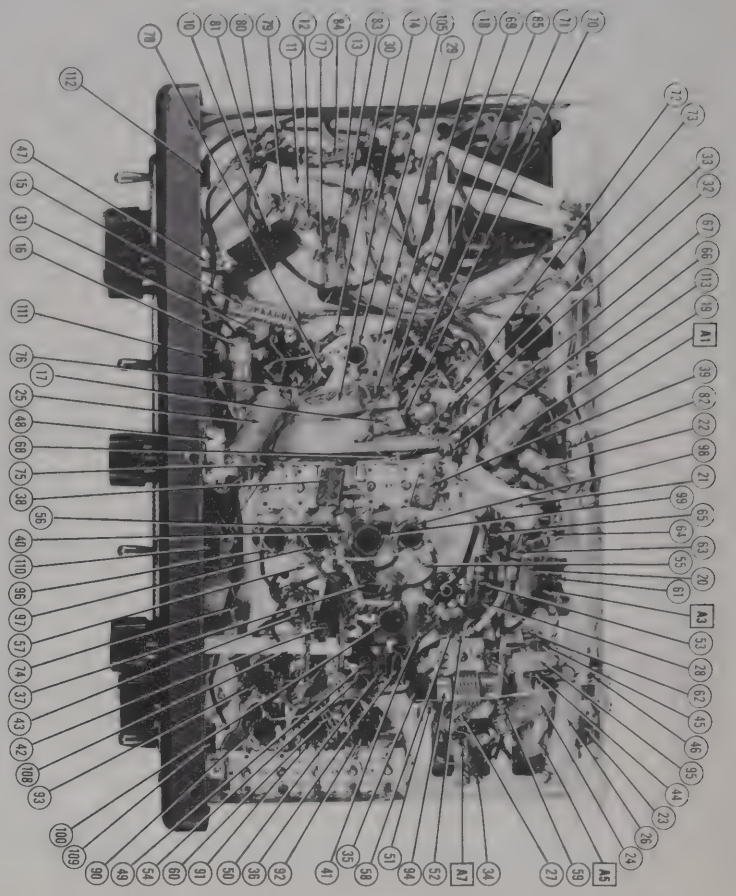
TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		HALLICRAFT. PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
87	7000Ω	3.2Ω	600Ω	.7Ω	55B107	A-3878	T-22S47	A-2.31	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	VC IMP.	HALLICRAFTERS PART No.	JENSEN PART No.	QUAM PART No.	
88	PM	3.2Ω	85C030	ST-10S Mod. P8-X	5A1	
	CONE DIA.	VC DIA.				
89	4½"	1/2#				

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

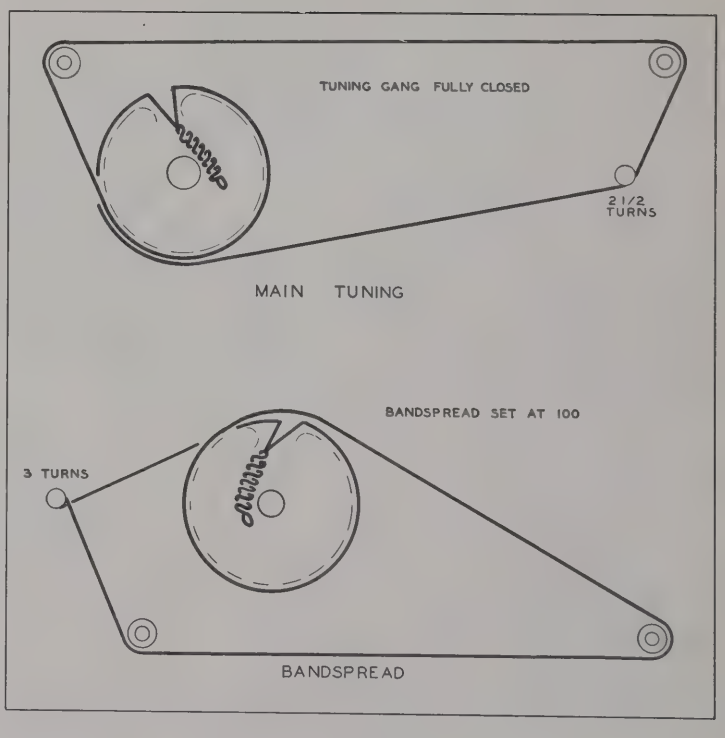
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	HALLICRAFT. PART No.	MEISSNER PART No.	
	Band					
90	Ant. Coil 1	50Ω	4.5Ω	51B1028		
91	" " 2	3.5Ω	.5Ω	51B1027		
92A	" " 3	1.1Ω*	.1Ω	51B1026		*Common primary.
B	" " 4		0Ω			
93	" " 5	0Ω	0Ω	51B1030		
94	Wave Trap		0Ω	51B1036		
95	Low Pass Filter		0Ω	53A135		
96	Osc. Coil 1	.8Ω	3.3Ω	51B1031		
97	" " 2	.3Ω	.2Ω	51B1032		
98	" " 3	.2Ω	0Ω	51B1033		
99	" " 4	.1Ω	0Ω	51B1034		
100	" " 5	0Ω	0Ω	51B1035		
101	1st IF Trans.	1.2Ω	1.2Ω	50B36[illegible]		
102	2nd " "	1.2Ω	1.2Ω	50B369		
103	3rd " "	1.2Ω	1.2Ω	50B369		
104	4th " "	1.2Ω	1.2Ω	50B369		
105	BFO Coil		.5Ω	54B038		

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					HALLICRAFTERS PART No.		
106	Bayonet	6-8	0.25	Blue	30A003		Type 44
107	"	"	"	"	30A003		" "

MISCELLANEOUS

ITEM No.	PART NAME	HALLICRAFTERS PART No.	NOTES
108	Switch	60B323	Band
109	"	60A138	Standby-Receive (Toggle SPST)
110	"	60A285	CW-AM (Toggle DPST)
111	"	60A134	Noise Limiter (Toggle SPST)
112	"	60A138	Tone (Toggle SPST)
113	"	60A243	Speaker-Phone (Slide SPDT)
114	2 Gang Var. Cap.	48C198	(21-429 MMF) each section
	Trimmer Assby.	44B354	A10, A12, A13, A15, A17, A19
	" "	44E385	A11, A14, A16, A18, A20
A21	Trimmer	44A356	Wave Trap Adj.
	Dial Glass	320384	Calibrated
	Dial Pointer	82A149	Main
	" "	82A148	Bandspread



DATE 5/49-#489-8
SRS-F10DR-#

VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6BA6	-3.4VDC	0V.	0V.	6.4VAC	220VDC	45VDC	4.2VDC	-
2	6C4	100VDC	0V.	0V.	6.4VAC	100VDC	-6VDC§	0V.	-
3	6BA6	0V.	1VDC	0V.	6.4VAC	220VDC	90VDC	1VDC	-
4	6BA6	0V.	1.2VDC	0V.	6.4VAC	200VDC	90VDC	1.2VDC	-
5	6H6	0V.	4.7VAC	-.5VDC	0V.	-.1VDC	0V.	0V.	0V.
6	6SC7	0V.	77VDC	-.4VDC	-2.5VDC**§	182VDC**	0V.	0V.	6.4VAC
7	6K6GT	0V.	0V.	230VDC	220VDC	0V.	220VDC	6.4VAC	16.5VDC
8	5Y3GT	210VDC	242VDC	0V.	230VAC	0V.	230VAC	83VAC	242VDC

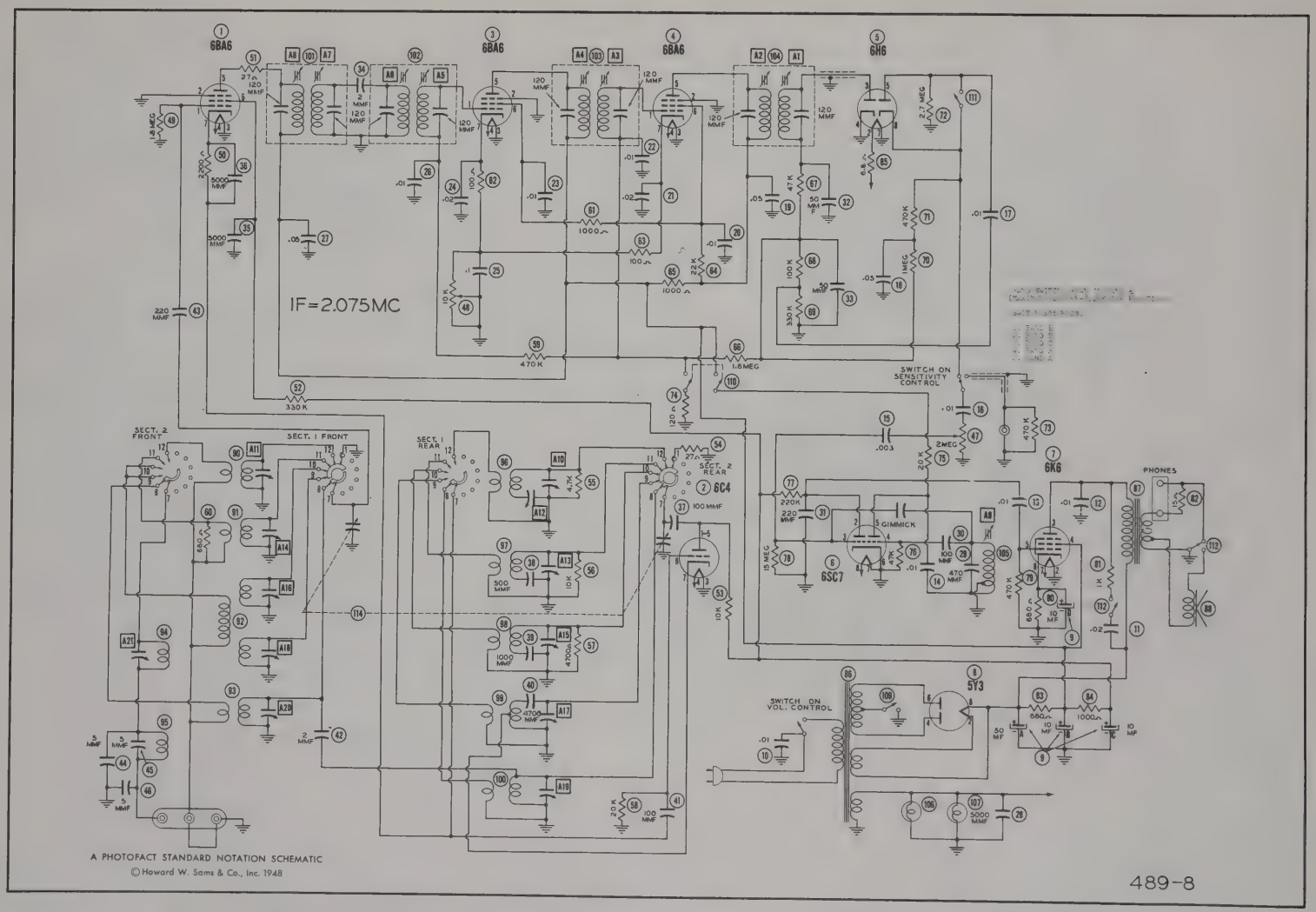
§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6BA6	1.5 Meg.	0Ω	0Ω	.1Ω	100KΩ	47KΩ	2.2KΩ	-
2	6C4	110KΩ	INF.	0Ω	.1Ω	110KΩ	22KΩ	0Ω	-
3	6BA6	3 Meg.	100Ω	0Ω	.1Ω	100KΩ	120KΩ	100Ω	-
4	6BA6	2.5 Meg.	100Ω	0Ω	.1Ω	100KΩ	120KΩ	100Ω	-
5	6H6	0Ω	3Ω	500KΩ	0Ω	2.6 Meg.	1.5 Meg.	0Ω	2 Meg.
6	6SC7	0Ω	320KΩ	15 Meg.	47KΩ**	120KΩ**	0Ω	0Ω	.1Ω
7	6K6GT	0Ω	0Ω	100KΩ	100KΩ	470KΩ	100KΩ	.1Ω	600Ω
8	5Y3GT	100KΩ	100KΩ	0Ω	200Ω	INF.	150Ω	INF.	100KΩ

AM-CW SWITCH IN AM POSITION.
NOISE LIMITER SWITCH ON.
STANDBY RECEIVE SWITCH IN RECEIVE POSITION.
PHONO SENSITIVITY CONTROL AT MAXIMUM SENSITIVITY.
**AM-CW SWITCH IN CLOCKWISE POSITION.

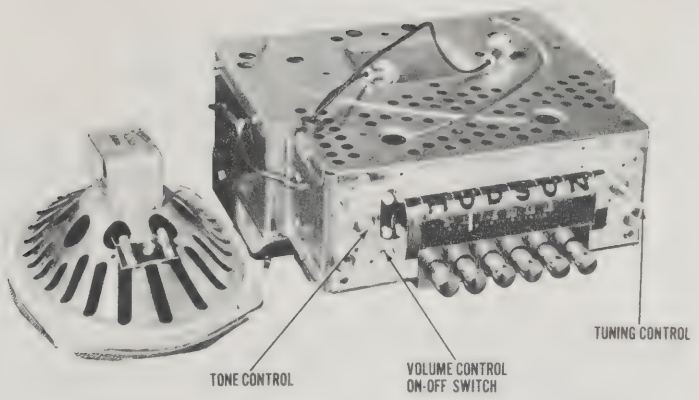
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

DATE 5/48-489-8 SST #8C-FOLDER #8

HUDSON MODEL DB48
(FACT. #6MH889)



HUDSON MODEL DB48

TRADE NAME	Hudson, Model DB48 (Factory Model 6MH889)
SUPPLIER	Hudson Motor Car Co., Detroit, Mich.
TYPE SET	Battery Operated Custom-Built Automotive Superheterodyne Receiver
TUBES (SIX)	Types, 7A7 RF Amp., 7B8 Converter, 6BA6 IF Amp., 7B6 Det.-AVC-AF, 6V6GT Power Output, 7Y4 Rectifier.
POWER SUPPLY	6 Volt Storage Battery
TUNING RANGE—BROADCAST	540-1600KC
RATING	6 Amp. @ 6.3 Volts

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

For dummy antenna connect two 30MMF capacitors in series and place across the output of the sig. gen. Connect receiver antenna to the junction of the capacitors and connect low side of sig. gen. to chassis. This value of dummy antenna must be used to insure proper tracking when installed in car. If calibration is off after completing adjustments it can be corrected by loosening dial scale mounting screws and sliding scale to desired position. If cores are adjusted apply speaker cement to core screw threads.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 6 (grid) of 7B8. Low side to chassis.	265KC	Tuning slugs fully out.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output.
2	See pre-alignment instructions.	High side to ant. lead. Low side to chassis.	535KC	Tuning slugs fully in.	"	A5	" " " "
3	"	"	1200KC	Tune for maximum output.	"	A6,A7	Adjust for maximum output. If dial calibration is off pointer may be corrected by adjusting cam screw at end of pointer.
	Reinstall receiver in car. Allow to warm up for approximately 15 minutes, and with antenna extended, tune in weak station near 1200KC. Adjust A7 for maximum volume.						
4	See pre-alignment instructions.	High side to ant. lead. Low side to chassis.	1700KC	High freq. end of dial.	Across voice coil	A5,A6, A7	Screw the cores completely out of the antenna, converter, and oscillator coils. Adjust A5, A6 and A7 for maximum output. Reposition cores to their approximate original positions.
5	"	"	1200KC	1200KC	"	A8	Adjust for maximum output.
6	"	"	"	"	"	A9,A10	" " " "
7	"	"	600KC	Tune for maximum output.	"	A11	Rock tuning control and adjust for maximum output. Check receiver at 1200KC. If weak or off calibration, repeat Steps 5, 6 & 7. Check high freq. end limit. Bend mechanical stop for cross arm to make end limit exactly 1605KC.

PUSHBUTTON ADJUSTMENT

There are six automatic tuning positions which may be adjusted to six desired stations. Adjust as follows:

1. Loosen the first pushbutton by turning counter-clockwise with the fingers.
2. Turn manual tuning control to the desired station. Tune very carefully for clearest reception.
3. Depress first pushbutton and release. Tighten securely with fingers.
4. Repeat the procedure outlined above for the remaining pushbuttons.

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	7A7	7A7	8V	
2	Converter	7B8	7B8	8X	
3	IF Amp.	6BA6	6BA6	7AA	
4	Det.-AVC-AF	7B6	7B6	8W	
5	Power Output	6V6GT	6V6GT	7AC	
6	Rectifier	7Y4	7Y4	8AF	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: ZENITH PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7A	20	350	22-1644	AF44J	UP2235	DY-2x20-350	TL-212*	Filter
B	10	300						"
8	.006	1000	22-1446					Buffer
9	.5	100						Hash Filter
10	.5	100		4e4-.5	DT2P5	SHH-1	TC-5	" "
11	.005	600	22-838	684-005	DT6D5	ST-6-005	TC-25	Output Plate Bypass
12	.01	600	22-1170	684-01	DT6S1	ST-6-01	TC-11	Audio Coupling
13	.003	200	22-11e0	4e4-003	DT6D3	ST-6-003	TC-23	Tone Compensation
14	.02	200		484-02	DT2S2	ST-4-02	TC-12	" "
15	.005	200	22-906	484-005	DT6D5	ST-6-005	TC-25	Audio Coupling
16	.1	400	22-170	484-.1	DT4P1	ST-4-1	TC-1	Screen Bypass
17	.05	200	22-250	484-05	DT2S5	ST-4-05	TC-15	AVC Filter
18	.1	200	22-190	484-.1	DT2P1	ST-2-1	TC-1	RF Cathode Bypass
19	.005	400		484-005	DT6D5	ST-6-005	TC-25	Ant. Coupling
20	250	500	22-1136	1468-00025	5W5T25	MO.5-325	1FM-325	AF Plate Bypass
21	100	300	22-365	1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Feedback-Cer.
22	100	300	22-365	1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Cap.-Cer.
23	260	500						Fixed Trimmer
24	250	500	22-182	1468-00025	5R5T25	MO.5-325	MS-325	" "
25	100	300	22-365	1468-0001	5W5T1	MO.5-31	1FM-31	RF Coupling
26	100	500		1468-0001	5R5T1	MO.5-31	MS-31	Fixed Trimmer

*Omit one section.

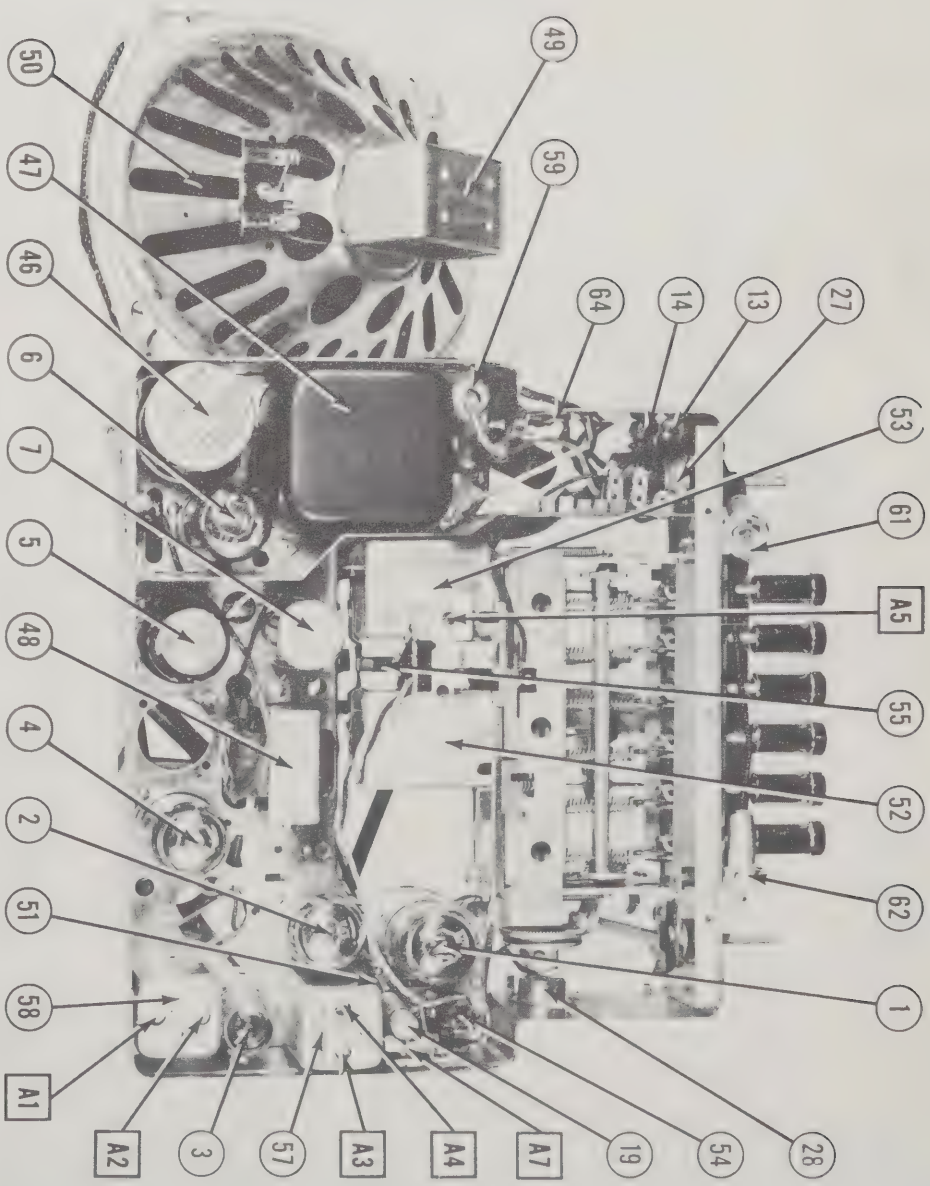
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ZENITH PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
27A	250KΩ	½				Volume Control tapped @ 100KΩ
B	1.5 Meg.		63-1587EX			Tone Control
28	800Ω	1	63-1379			Sensitivity Control

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ZENITH PART No.	IRC PART No.	IDENTIFICATION CODES
29	270KΩ	½	63-1385	BTS-330K	Or.-Or.-Yl. RF Grid
30	15KΩ	½	63-1411	BTS-15K	Br.-Gray-Or. RF Plate Load
31	330KΩ	½	63-1392	BTS-330K	Or.-Or.-Yl. Converter Grid
32	68KΩ	½		BTS-68K	Blue-Gray-Or. Oscillator Grid
33	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Blue AVC Network
34	15KΩ	½	63-1401	BTS-15K	Br.-Grn.-Or. Oscillator Plate Load
35	33KΩ	1	63-1398	BTA-33K	Or.-Or.-Or. Screen Dropping
36	1 Meg.	½	63-1390	BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
37	22KΩ	½	63-1387	BTS-22K	Red-Red-Or. Tone Compensator
38	15 Meg.	½	63-1401	BTS-15 Meg.	Br.-Grn.-Blue AF Grid
39	330KΩ	½	63-1392	BTS-330K	Or.-Or.-Yl. AF Plate Load
40	330KΩ	½	63-1392	BTS-330K	Or.-Or.-Yl. Output Grid
41	2.7Ω	1	63-1360	BW-1-2.7	Red-Vi.-Gold Cathode
42	150Ω	2	63-1360	BT-2-150	Br.-Gray-Red Filter
43	680Ω	½	63-1402	BW-½-680	Gray-Red-Blk. Hash Suppression
44	680Ω	½	63-1402	BW-½-680	Gray-Red-Blk. " "
45	150Ω	½	63-1396	BW-½-150	Br.-Grn.-Br. IF Cathode

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: RADIART PART No.	INSTALLATION NOTES
46	Interrupter	6.3	115 ∿	190-22	5300	

TRANSFORMER (VIBRATOR)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: THORDARSON PART No.	REPLACEMENT DATA: MERIT PART No.
47	6.3V DC @ 3.3A	500V AC @ .053A			95-1066	P-4064	T-22R20	

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: THORDAR'N PART No.	REPLACEMENT DATA: MERIT PART No.	INSTALLATION NOTES
48	6000Ω	3.5Ω	530Ω	.36Ω	95-1030	A-3878	T22S47	A-2000	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: JENSEN PART No.	REPLACEMENT DATA: QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.				
49	PM	3.5Ω	40-623		69A3	
	CONE DIA.	VC DIA.				
50	6"x9"	3/4"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: MEISSNER PART No.	
51	Ant. Choke Coil		.7Ω			
52	Ant. Coil		12Ω			
53	RF Coil		12Ω			
54	Osc. Coil	3.6Ω	7.2Ω			
55	Osc. Shunt Coil		2.6Ω			
56	Osc. Trimmer Coil		.6Ω			
57	Input IF	40Ω	40Ω			
58	Output IF	60Ω	60Ω			
59	RF Choke		0Ω			
60	" "		0Ω			

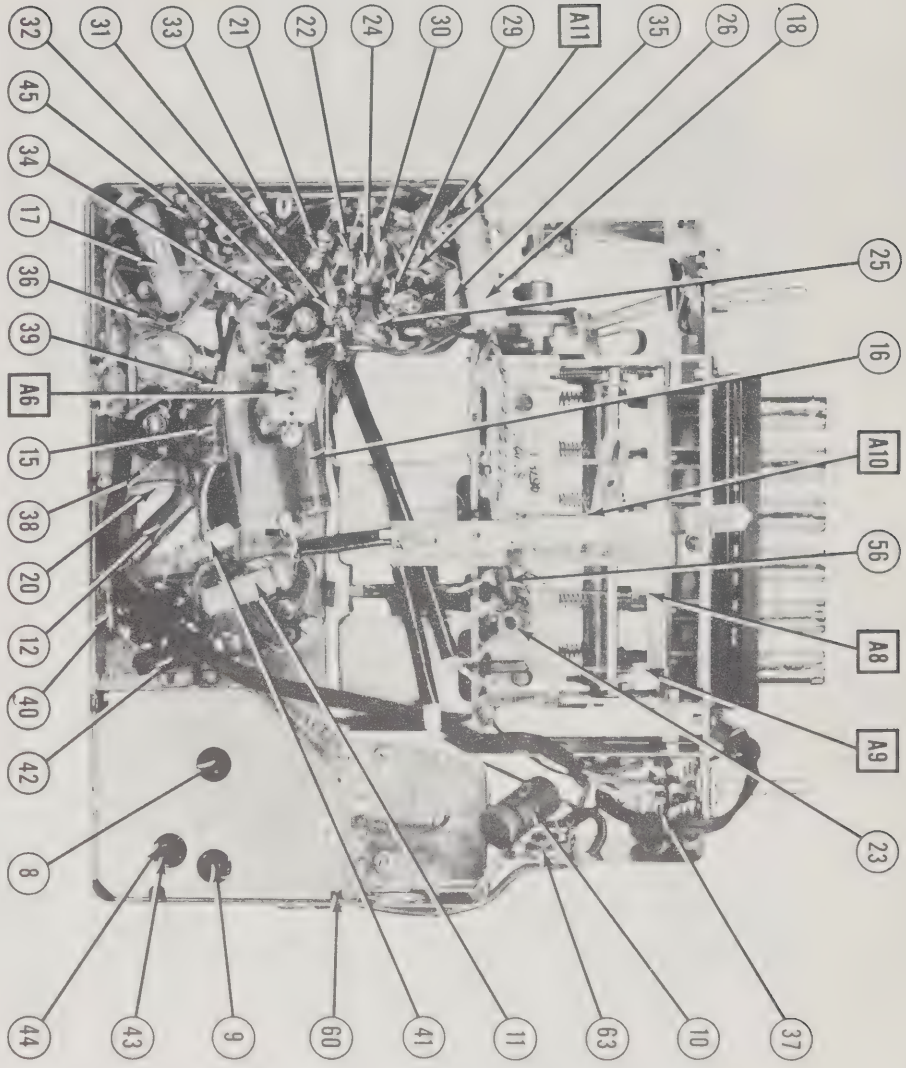
DIAL LIGHT

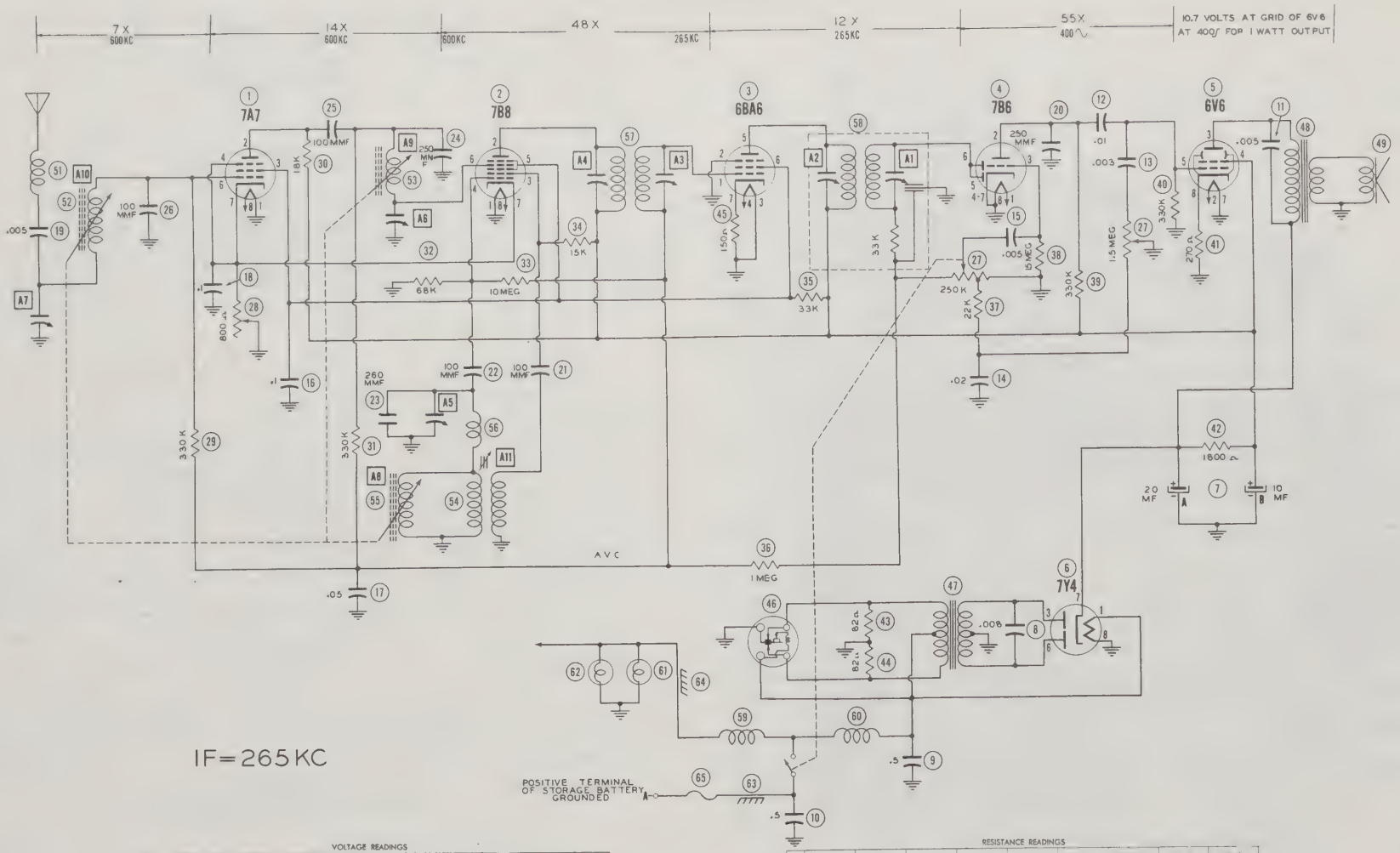
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA:	INSTALLATION NOTES
61	Bayonet	6-8	0.25	Blue			Type 44
62	"	6-8	0.25	"			" "

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
63	Spark Plate		
64	Fuse		14 Amp. (SFE)

CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	7A7	0V.	96VDC	60VDC	0V.	0V.	-.4VDC	0V.	6.3VDC
2	7B8	0V.	200VDC	166VDC	-5VDC§	60VDC	-.4VDC	0V.	6.3VDC
3	6BA6	-.4VDC	0V.	0V.	6.3VDC	200VDC	60VDC	.6VDC	-
4	7B6	6.3VDC	99VDC	-.5VDC	0V.	-.6VDC	[illegible]	[illegible]	[illegible]
5	6V6GT	0V.	6.3VDC	222VDC	200VDC	0V.	0V.	0V.	9.5VDC
6	7Y4	6.3VDC	0V.	250VAC	250VAC	0V.	250VAC	240VDC	0V.

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	7A7	0Ω	120KΩ	130KΩ	0Ω	0Ω	[illegible]	[illegible]	[illegible]
2	7B8	0Ω	100KΩ	120KΩ	68KΩ	130KΩ	[illegible]	[illegible]	[illegible]
3	6BA6	1.2 Meg.	0Ω	[illegible]	[illegible]	100KΩ	130KΩ	150Ω	-
4	7B6	[illegible]	[illegible]	[illegible]	15 Meg.	0Ω	280KΩ	280KΩ	[illegible]
5	6V6	0Ω	.5Ω	100KΩ	100KΩ	330KΩ	INF.	0Ω	[illegible]
6	7Y4	.5Ω	INF.	340Ω	340Ω	INF.	320Ω	100KΩ	-

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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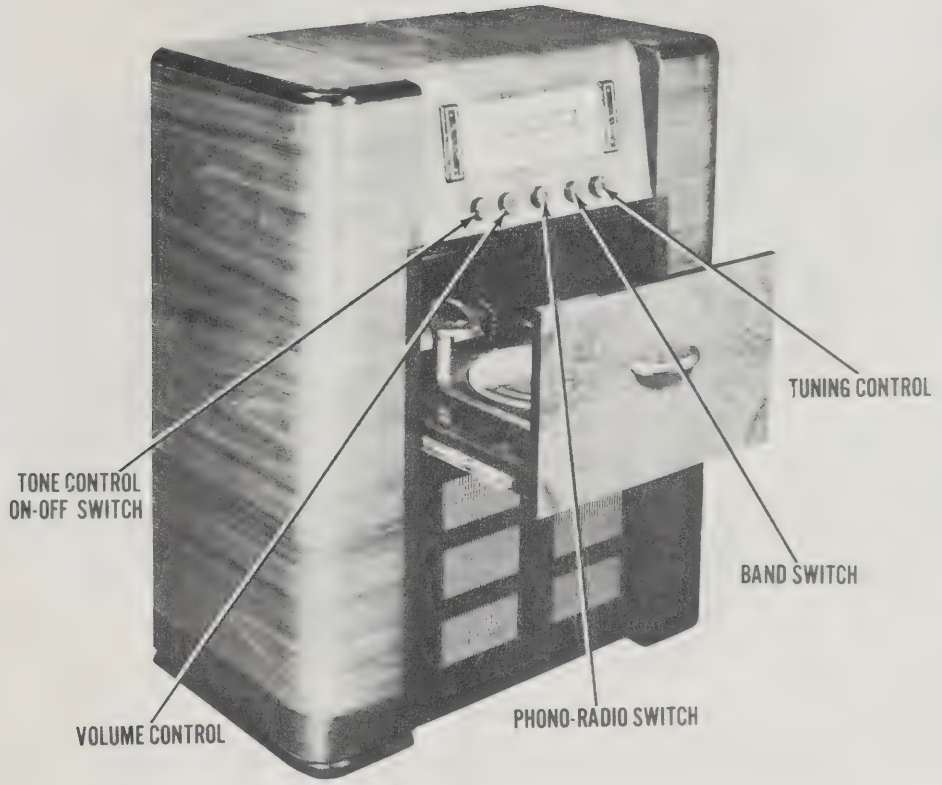
RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

The stage gain measured values listed above approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by connecting negative (-) 3 volts to the AVC line.

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volts.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Battery voltage maintained at 6.3 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - Volume and sensitivity control at maximum, no signal applied for voltage measurements.

KNIGHT MODEL
6D-360



KNIGHT MODEL
6D-360

KNIGHT MODEL 6D-360

TRADE NAME	Knight, Model 6D-360
SUPPLIER	Allied Radio Corp., 833 W. Jackson Blvd., Chicago 7, Ill.
TYPE SET	AC Operated Combination Phono-Radio Two Band Superheterodyne with Loop Ant.
TUBES (SIX)	Types, 6SK7 RF Amp., 6SA7 Converter, 6SK7 IF Amp., 6SQ7 Det.-AVC-AF, 6K6GT Power Output, 5Y3GT Rectifier.
POWER SUPPLY	110-120 Volts AC
TUNING RANGE—BROADCAST	535-1725KC
RATING	.470 Amp. @ 117 Volts AC
SHORT WAVE	6-18.2MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is cabinet. Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to center stator of tuning cap. Low side to chassis.	455KC	BC (left)	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output.
2	250MMFD	High side to ext. ant. terminal. Low side to chassis. (Be sure link is connected for ext. ant. connection.)	1725KC	"	"	"	A5	" " " "
3	250MMFD	"	1500KC	"	Tune for maximum output.	"	A6,A7,	" " " "
4	400Ω carbon res.	"	18.2MC	SW (right)	Tuning cap. fully open.	"	A8	" " " "
5	"	"	16MC	"	Tune for maximum output.	"	A9	Rock tuning cap. and adjust for maximum output. Repeat all steps to insure greatest accuracy.

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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DATE 5/48 -#489-10 SET #39-FOLDER #10

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: KNIGHT PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	6SK7	6SK7	8N	
2	Converter	6SA7	6SA7	8R	
3	IF Amp.	6SK7	6SK7	8N	
4	Det.-AVC-AF	6SQ7	6SQ7	8Q	
5	Power Output	6K6GT	6K6GT	7S	
6	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: KNIGHT PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7	16	450	A18-274	PRS-450	BZ1045	M-16-450	UT-16	Filter
8	16	450	A18-279	PRS-450	BZ1045	M-16-450	UT-16	"
9	.01	1000	A16-168	1084-01	TVC10S1	TM-10-01	TC-11	Output Plate Bypass
10	.01	400	A16-156	484-01	DT4S1	ST-4-01	TC-11	Tone Compensation
11	.01	400	A16-156	484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
12	.05	400	A16-158	484-05	DT4S5	ST-4-05	TC-15	Audio Plate Decoupling
13	.01	400	A16-156	484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
14	.05	400	A16-156	484-05	DT4S5	ST-4-05	TC-15	IF Screen Bypass
15	.05	200	A16-152	484-05	DT4S5	ST-4-05	TC-15	Cathode Bypass
16	.05	400	A16-156	484-05	DT4S5	ST-4-05	TC-15	Conv. Screen Bypass
17	.05	400	A16-156	484-05	DT4S5	ST-4-05	TC-15	RF Screen Bypass
18	.05	200	A16-152	484-05	DT4S5	ST-4-05	TC-15	RF Cathode Bypass
19	.05	200	A16-152	484-05	DT4S5	ST-4-05	TC-15	AVC Filter
20	.05	200	A16-152	484-05	DT4S5	ST-4-05	TC-15	" "
21	50	500	A15-175	1469-00005	5R5T5	MO.5-35	MS-45	Osc. Grid
22	5000	300	A16-181	1464-005	1DR5	MW.5-25	1FM-25	Fixed Padder
23	50	500	A15-175	1469-00005	5R5T5	MO.5-45	MS-45	RF Primary Shunt
24	5		A83-355	1469-000005	5R5V5	MO.5-55	MS-55	RF Coupling Cer.
25	50	500	A15-175	1464-005	5R5T5	MO.5-45	1FM-45	Fixed Trimmer
26	200	500	A15-189	1469-0002	5R5T2	MO.5-32	1FM-32	" "
27	250	500	A15-176	1469-00025	5R5T25	MO.5-325	1FM-325	AF Plate Bypass
28	270	500	A15-176	1469-00025	5R5T25	MO.5-325	MS-35	RF Coupling

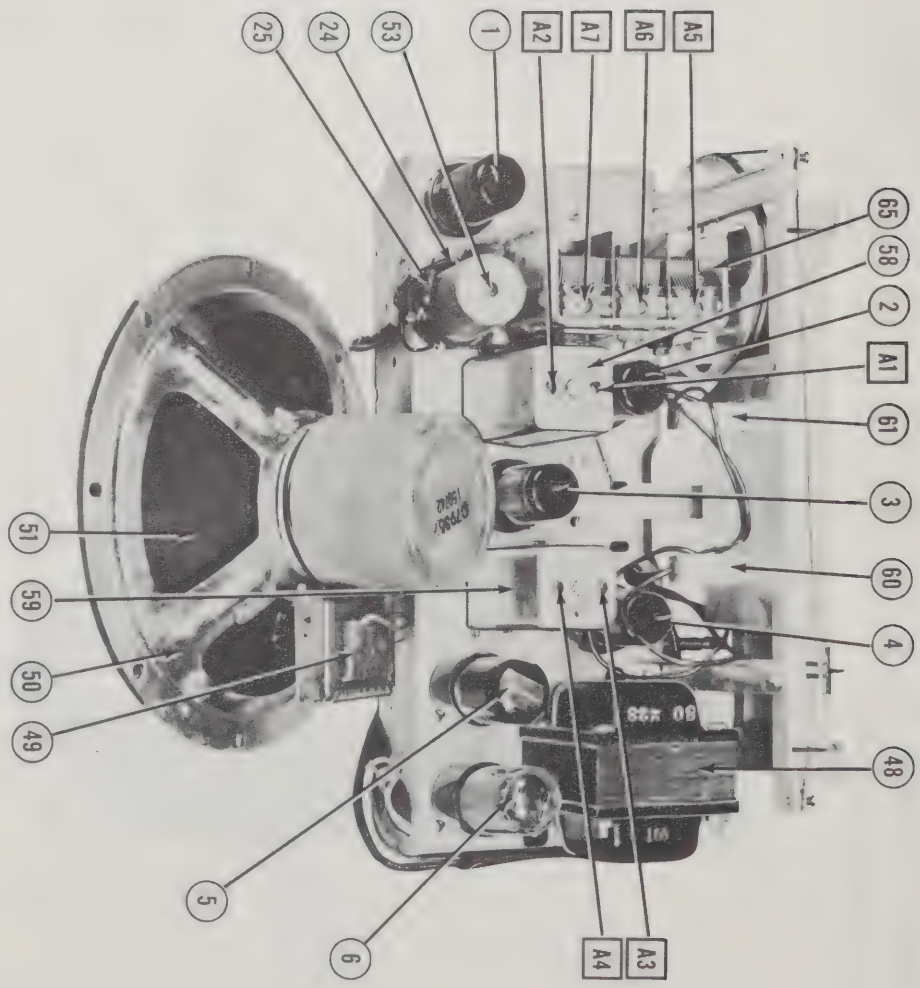
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: KNIGHT PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
29A	500KΩ	½	A24-169	D13-133	AM-60-Z	Volume Control
B	Shaft		Not Req.	E	KSS-3	Attach to 29A per instructions
30A	500KΩ	½	A26-124	D13-133	AM-60-Z	Tone Control
B	Shaft		Not Req.	E	KSS-3	Attach to 30A per instructions
C	Switch		" "	41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: KNIGHT PART No.	IRC PART No.	IDENTIFICATION CODES
31	220KΩ	½	A60-667	BTS-220K	Red-Red-Yl. AVC Network
32	150Ω	½	A60-686	BW-½-150	Br.-Grn.-Br. RF Cathode
33	100KΩ	½	A60-671	BTS-100K	Br.-Blk.-Yl. RF Screen Dropping
34	470KΩ	½	A60-662	BTS-470K	Yl.-Vi.-Yl. Converter Grid
35	27KΩ	1	A60-692	BTA-27K	Red-Vi.-Or. Converter Screen Dropping
36	22KΩ	½	A60-659	BTS-22K	Red-Red-Or. Oscillator Grid
37	68Ω	½	A60-733	BW-½-68	Blue-Gray-Blk. Parasitic Suppressor
38	150Ω	½	A60-686	BW-½-150	Br.-Grn.-Br. IF Cathode
39	100KΩ	½	A60-671	BTS-100K	Br.-Blk.-Yl. IF Screen Dropping
40	220KΩ	½	A60-667	BTS-220K	Red-Red-Yl. Series Phono
41	10 Meg.	½	A60-663	BTS-10 Meg.	Br.-Blk.-Blue AF Grid
42	220KΩ	½	A60-667	BTS-220K	Red-Red-Yl. AF Plate Load
43	220KΩ	½	A60-667	BTS-220K	Red-Red-Yl. AF Plate Decoupling
44	470KΩ	½	A60-692	BTS-470K	Yl.-Vi.-Yl. Output Grid
45	560Ω	1	A60-701	BTA-560	Grn.-Blue-Br. Output Cathode
46	82KΩ	1	A60-700	BTA-82K	Gray-Red-Or. Bleeder
47	1000Ω	2	A60-699	BT-2-1000	Br.-Blk.-Red Filter

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	KNIGHT PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
48	117V AC @ .47A	590V CT @ .06A	5.0V AC @ 2.0A	6.3V AC @ 2.0A	C80-223	P-6119*	T22R02*	P-3151†

*Mount vertically with universal mounting brackets.
†Drill new mounting holes and add series resistor to reduce plate voltage.

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		KNIGHT PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
49	7500Ω	4.1Ω	365Ω	.7Ω	A80-222	A-3822	T22S87	A-2301	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			KNIGHT PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.		ST-117		
50	PM	4.1Ω	C79-357	Mod. P8-T		
	CONE DIA.	VC DIA.				
51	7"	7/8"	NOT READILY REPLACEABLE-USE COMPLETE SPEAKER UNIT			

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	KNIGHT PART No.	MEISSNER PART No.	
52	Loop Ant.		.1Ω			
53	BC Ant.Coil	63Ω	4Ω			
		.1Ω		C10-459	14-1026	
54	SW Ant.Coil	.5Ω	.5Ω	A10-482		
55	RF Coil	68Ω	2.5Ω	B10-452	14-1027	
56	BC Osc.Coil		6Ω	B10-446	14-1040	
57	SW Osc.Coil		.8Ω	A10-481		
58	Input IF	17.5Ω	26Ω	B10-412	16-6658	
59	Output IF	18Ω	18Ω	B10-444	16-6660	

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					KNIGHT PART No.		
60	Bayonet	6-8	0.15	Brown			Type 47
61	"	"	"	"			" "

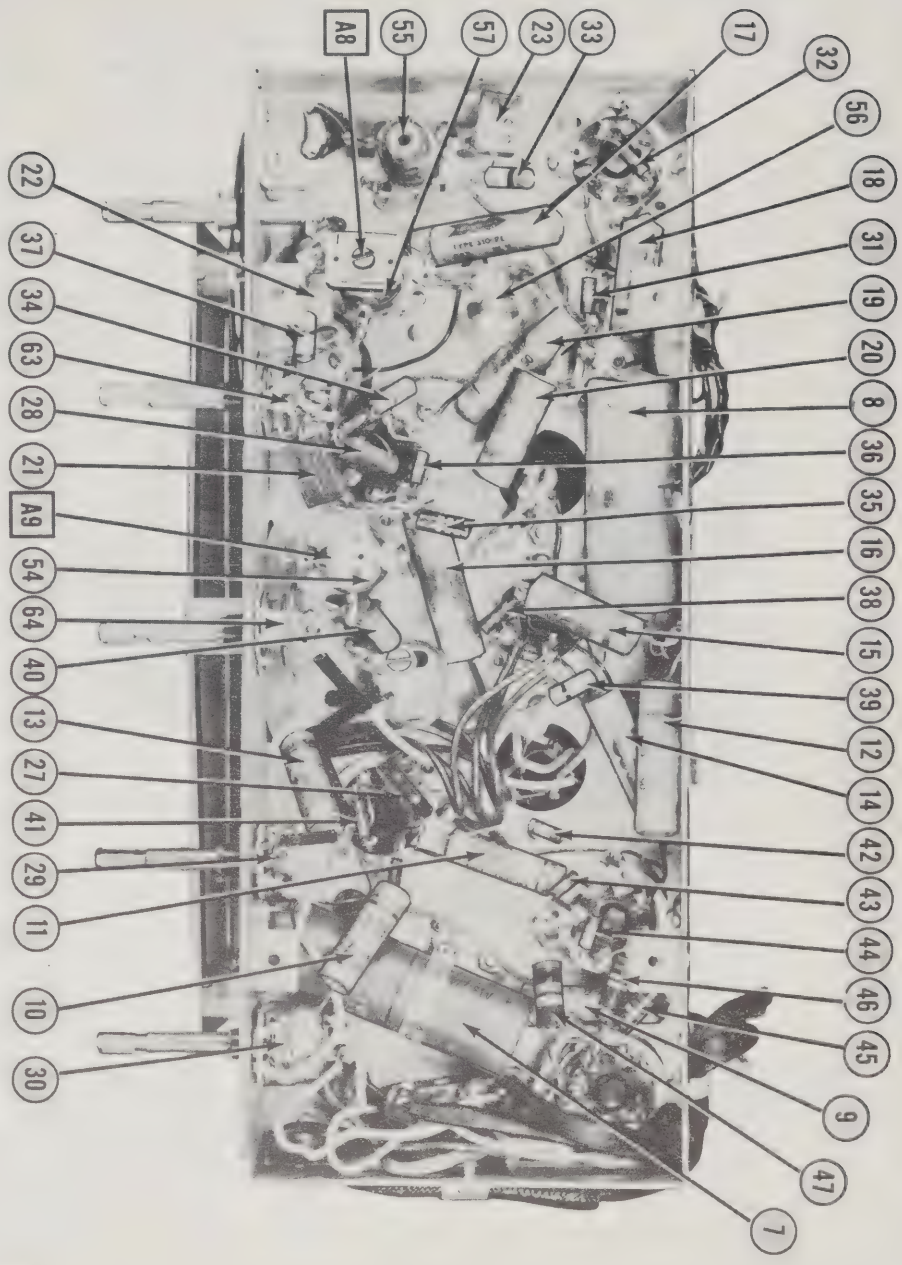
PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA		REMARKS
	KNIGHT PART No.	ASTATIC PART No.	
62		L-70-A	

MISCELLANEOUS

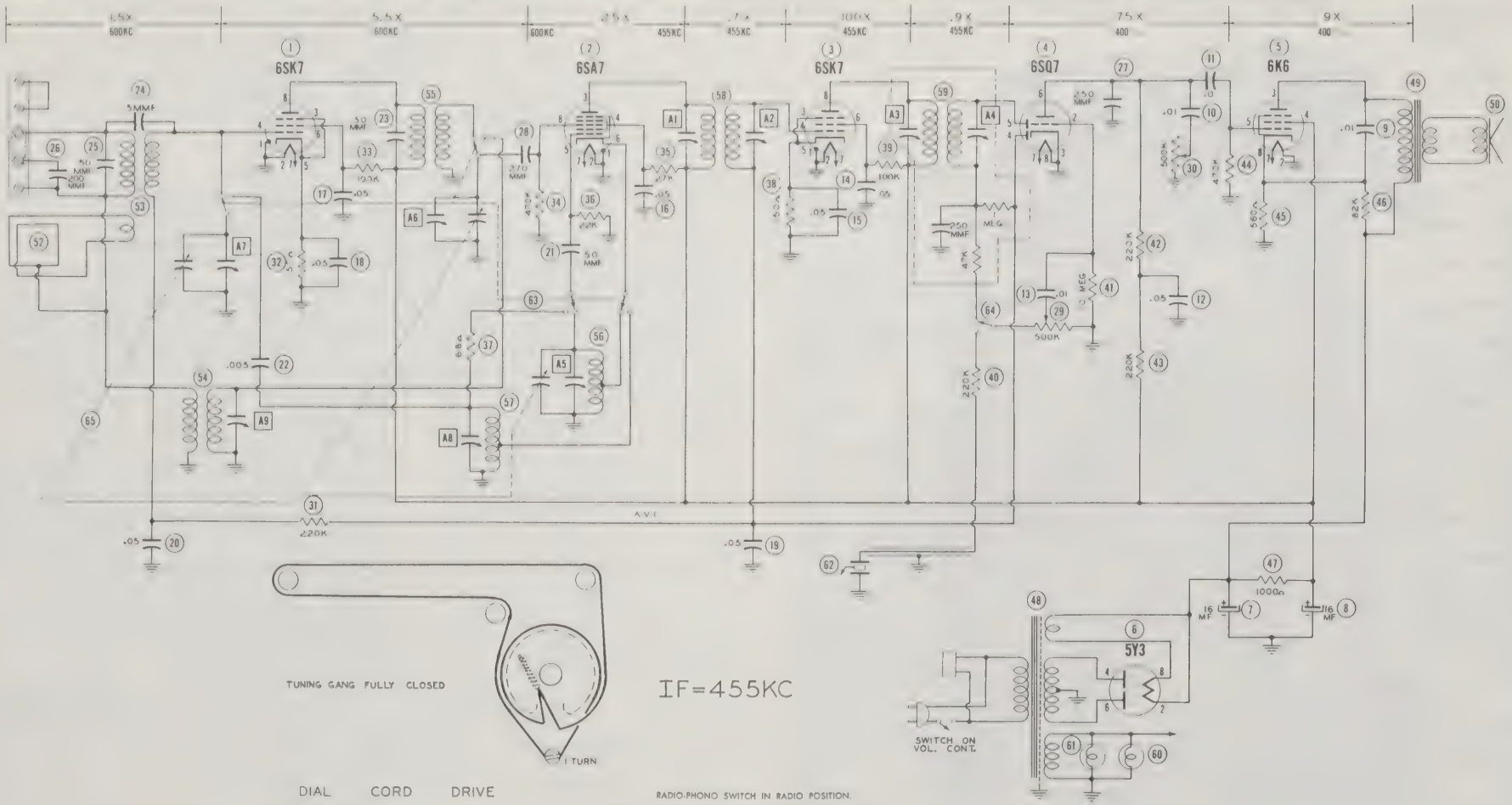
ITEM No.	PART NAME	KNIGHT PART No.	NOTES
63	Switch	A69-176	Band
64	"	A69-180	Radio-Phono
65	3 Gang Var. Cap.	B19-186	(73-390MMF) each section
A8	Trimmer	A20-143	SW-Ant. Adj.
A9	"	A20-143	SW Osc. Adj.
	Dial Scale	C67-507	Glass
	Dial Pointer	A58-67	

CHASSIS—BOTTOM VIEW



DATE 5/49-#489-10 SST #39-FOLDER #1

KNIGHT MODEL 6D-36



RADIO-PHONO SWITCH IN RADIO POSITION.

VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1									
2									
3									
4									
5									
6									

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1									
2									
3									
4			10 Meg.						
5									
6									

§TAKEN WITH VACUUM TUBE VOLTMETER

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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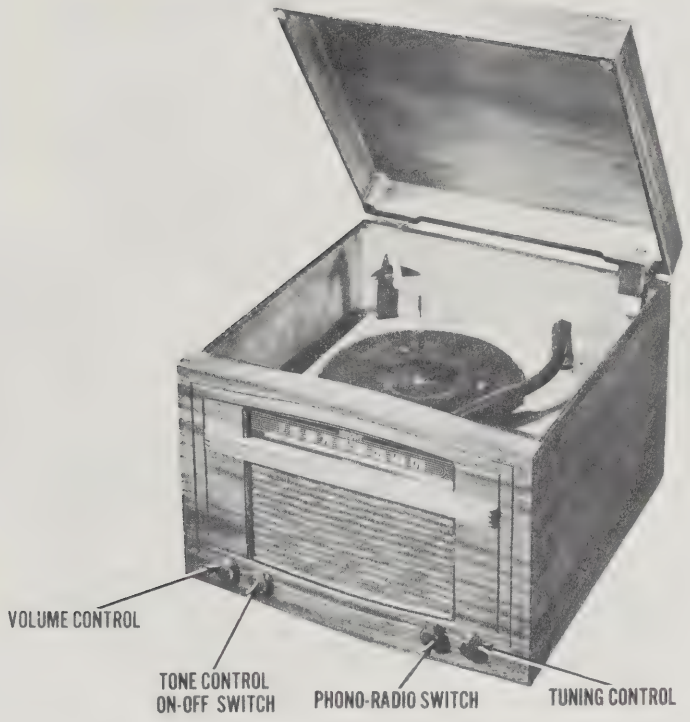
489-10

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. **DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.**
2. **Socket connections are shown as bottom views.**
3. **Measured values are from socket pin to common negative.**
4. **Line voltage maintained at 117 volts for voltage readings.**
5. **Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.**
6. **Volume control at maximum, no signal applied for voltage measurements.**

KNIGHT MODEL
7D-405



KNIGHT MODEL
7D-405

KNIGHT MODEL 7D-405

TRADE NAME	Knight, Model 7D-405
SUPPLIER	Allied Radio Corp., 833 W. Jackson Blvd., Chicago 7, Ill.
TYPE SET	AC Operated Combination Phono-Radio Superheterodyne Receiver with Loop Antenna
TUBES (SIX)	Types, 12SA7GT Converter, 12SG7 IF Amp., 12SQ7 Det.-AVC-AF, 12SQ7 Phase Inv., (2) 35L6GT Power Output.
POWER SUPPLY	105-125 Volts AC
TUNING RANGE—BROADCAST	537-1700KC RATING .37 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

There are five reference dots on dial backplate. Reading from left to right they are end limit (tuning cap. closed), 600KC, 1000KC, 1400KC and 1700KC. To set Pointer turn tuning cap. fully closed and set left edge of pointer saddle to end limit mark at left end of dial backplate.

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to rear stator of tuning cap. Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation. Repeat adjustments.
2		Loop	1400KC	Left edge of pointer saddle to 1400KC reference mark. (4th mark from left).	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	"	Tune for maximum output.	"	A6	Adjust for maximum output. Check calibration and sensitivity at 600KC.

HOWARD W. SAMS & CO., INC. **Indianapolis Indiana**

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: KNIGHT PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12SA7GT	12SA7GT	8AD	
2	IF Amp.	12SG7	12SG7	8BK	
3	Det.-AVC-AF	12SQ7	12SQ7	8AC	
4	Phase Inv.	12SQ7	12SQ7	8AC	
5	Power Output	35L6GT	35L6GT	7AC	
6	" "	35L6GT	35L6GT	7AC	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: KNIGHT PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7A	50	150	C0791	PRS150-50	EZ42215	DSB-403020-150	UT-501	Filter - Blue
B	20	150						" - Grn.
C	40	150		PRSA150-20-40	BR3015	M-20-150	TA-240	" - Red
8	.05	400	RCP10W4503A	484-.05	DT4S5	MPH-4-.05	TC-15	Line Filter
9	.005	600	RCP10W6502A	684-005	DT6D5	S-6-005	TC-25	Output Plate Bypass
10	.005	600	RCP10W6502A	684-005	DT6D5	S-6-005	TC-25	" " "
11	.005	600	RCP10W6502A	684-005	DT6D5	S-6-005	TC-25	Audio Coupling
12	.005	600	RCP10W6502A	684-005	DT6D5	S-6-005	TC-25	" "
13	.005	600	RCP10W6502A	684-005	DT6D5	S-6-005	TC-25	" "
14	.005	600	RCP10W6502A	684-005	DT6D5	S-6-005	TC-25	" "
15	.002	600	RCP10W6202M	684-002	DT6D2	S-6-002	TC-22	Tone Comp.
16	.002	600	RCP10W6202M	684-002	DT6D2	S-6-002	TC-22	" "
17	.005	600	RCP10W6502A	684-005	DT6D5	S-6-005	TC-25	Audio Coupling
18	.25	400	RCP10W4254A	484-.25	DT4P25	S-4-25	TC-2	Phono Isolation
19	.1	400	RCP10W4104A	484-.1	DT4P1	S-4-1	TC-1	RF Bypass Pwr. Supply
20	.02	400	RCP10W4203A	484-02	DT4S2	S-4-02	TC-12	AVC Filter
21	.25	400	RCP10W4254A	484-.25	DT4P25	S-4-25	TC-2	Line Isolation
22	.01	600	RCP10W6103A	684-01	DT6S1	S-6-01	TC-11	Ext. Ant. Coupling
23	220		RCM20A221M	1468-00025	5W5T25	MO.5-325	1HM-325	AF Plate Bypass

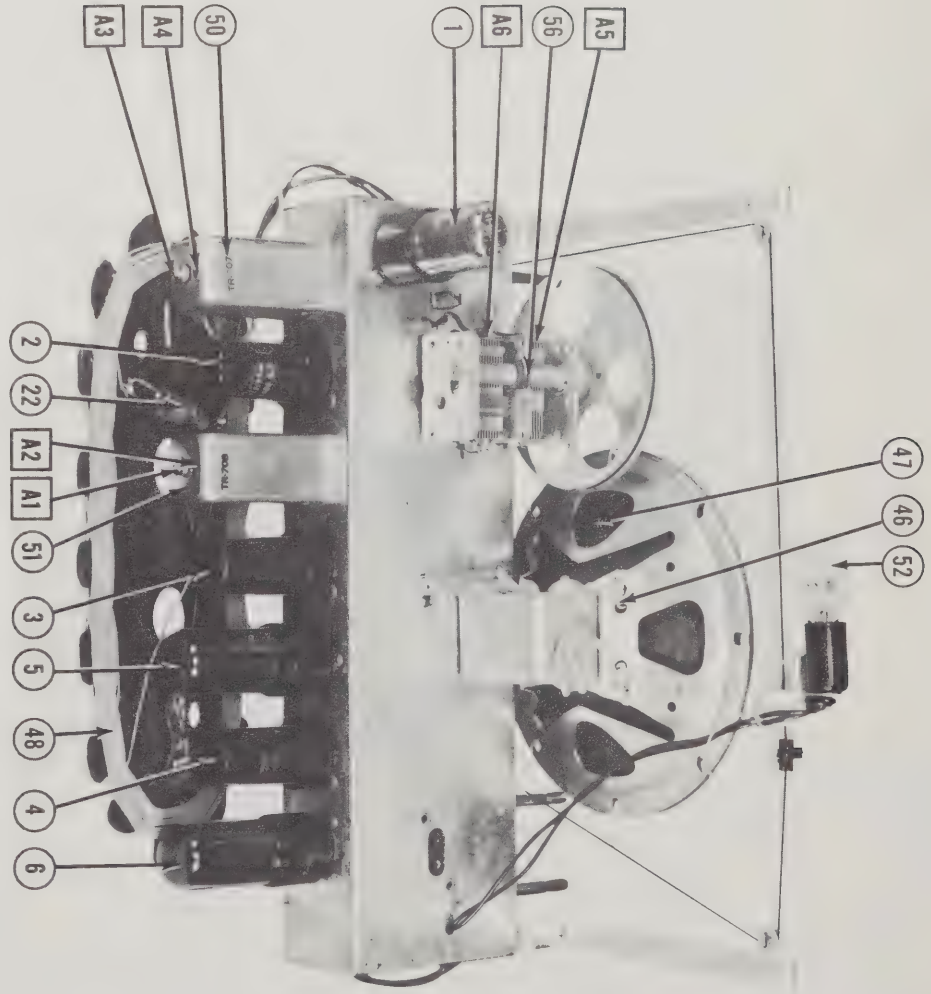
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: KNIGHT PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
24A	2 Meg.	½	PT-793	D13-139X	AT-115	Volume Control tapped @ 500KΩ
B	Shaft		Not Req.	E	KSS-3	Attach to 24A per instructions
25A	3 Meg.	½	PT-794	D13-140	AM-67-Z	Tone Control
B	Shaft		Not Req.	E	KSS-3	Attach to 25A per instructions
C	Switch		" "	41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: KNIGHT PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
26	220KΩ	½	REB-224M	BTS-220K	Red-Red-Yl. Line Isolation
27	22KΩ	½	REB-223M	BTS-22K	Red-Red-Or. Oscillator Grid
28	6.8 Meg.	½	REB-685M	BTS-6.8 Meg.	Blue-Gray-Grn. AVC Network
29	2.2 Meg.	½	REB-225M	BTS-2.2 Meg.	Red-Red-Grn. AVC Network
30	470KΩ	½	REB-474M	BTS-470K	Yl.-Vi.-Yl. Diode Load
31	330KΩ	½	REB-334M	BTS-330K	Or.-Or.-Yl. Series Phono
32	150KΩ	½	REB-154M	BTS-150K	Br.-Grn.-Yl. Phono Shunt
33	220KΩ	½	REB-224M	BTS-220K	Red-Red-Yl. Tone Compensation
34	6.8 Meg.	½	REB-685M	BTS-6.8 Meg.	Blue-Gray-Grn. AF Grid
35	470KΩ	½	REB-474M	BTS-470K	Yl.-Vi.-Yl. AF Plate Load
36	470KΩ	½	REB-474M	BTS-470K	Yl.-Vi.-Yl. Phase Inverter Plate Load
37	6.8 Meg.	½	REB-685M	BTS-6.8 Meg.	Blue-Gray-Grn. Phase Inverter Grid
38	470KΩ	½	REB-474M	BTS-470K	Yl.-Vi.-Yl. Output Grid
39	470KΩ	2	REB474M	BTS-470K	Yl.-Vi.-Yl. Output Grid
40	10KΩ	½	REB103M	BTS-10K	Br.-Blk.-Or. Output Grid
41	100Ω	1	REC101M	BW-1-100	Br.-Blk.-Br. Output Cathode
42	1000Ω	2	RED102M	BT-2-1000	Br.-Blk.-Red Filter
43	100Ω	1	REC101M	BW-1-100	Br.-Blk.-Br. Filter
44	27Ω	2	RED270K	BW-2-27	Red-Vi.-Blk. Surge Limiter

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		KNIGHT PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
45	4900Ω CT	3.5Ω	280Ω CT	.4Ω	TR-818	A-3856	T22858*	A-2900	*Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			KNIGHT PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.		ST-109†		†Drill and tap magnet frame.
46	PM	3.5Ω	SK-792	Mod. P6-W	6A21‡	‡Drill new mounting holes.
	CONE DIA.	VC DIA.				
47	6"	3/4"	NOT READILY REPLACEABLE-USE COMPLETE SPEAKER UNIT			

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	KNIGHT PART No.	MEISSNER PART No.	
48	Loop Ant.	0Ω	1Ω	LP951		
49	Osc. Coil	.5Ω	6Ω	CL869	14-1040#	#Add 50MMFD from osc. grid to high side tuning cap.
50	Input IF	20.5Ω	20.5Ω	TR707	16-6666	
51	Output IF	18.5Ω		TR708	16-6670	

DIAL LIGHT

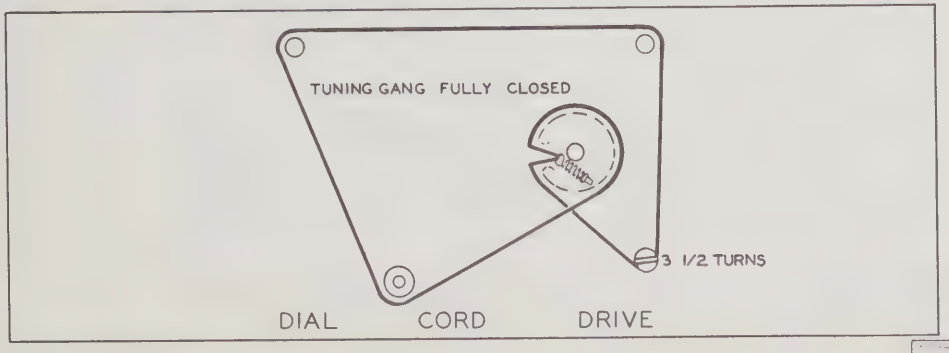
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					KNIGHT PART No.		
52	Screw	110			BU910		Type C-7

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA		REMARKS
	KNIGHT PART No.	ASTATIC PART No.	
53		L-70-A	L-70 original part.

MISCELLANEOUS

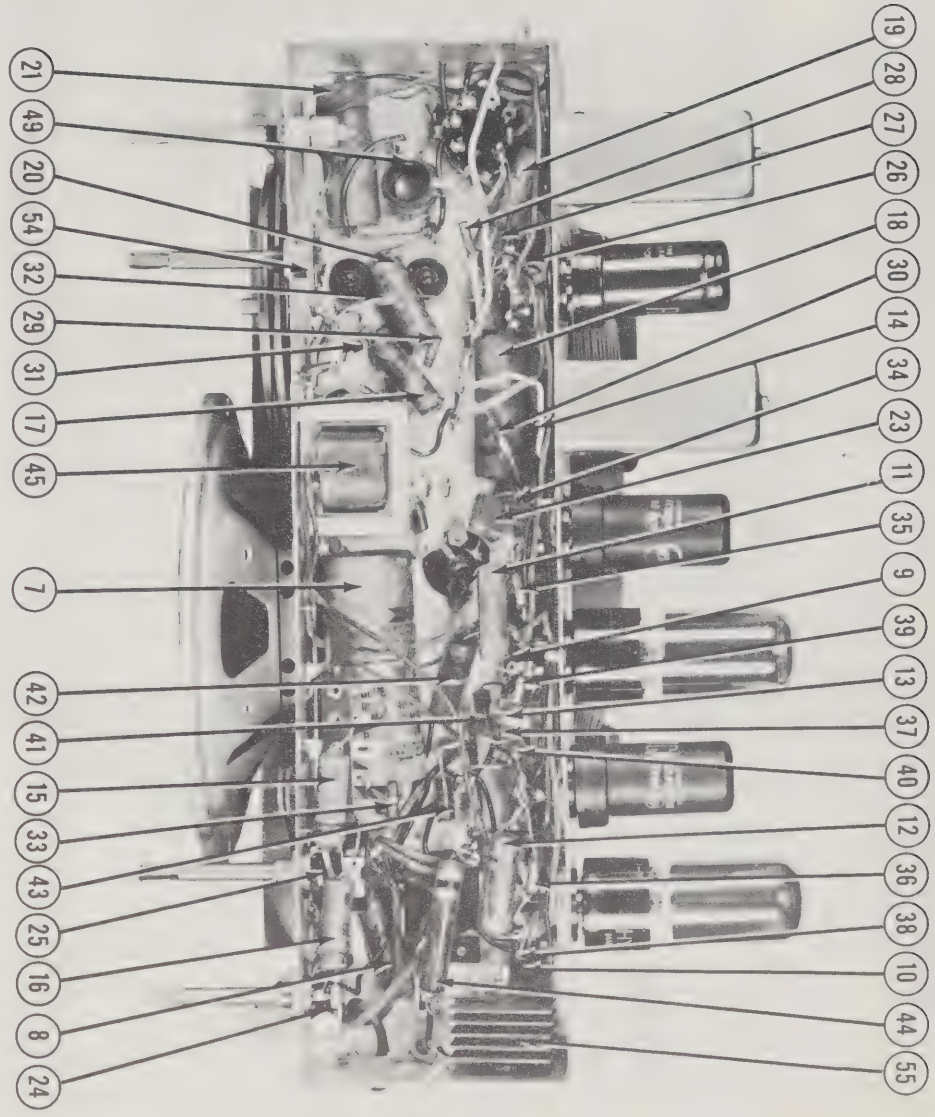
ITEM No.	PART NAME	KNIGHT PART No.	NOTES
54	Switch	SW141	Radio-Phono
55	Rectifier	RF845	Selenium
56	2 Gang Var. Cap.	CV769	(15-459 MMF, 28-193MMF)
	Dial Scale	DL913	Glass
	Dial Pointer	PO559	

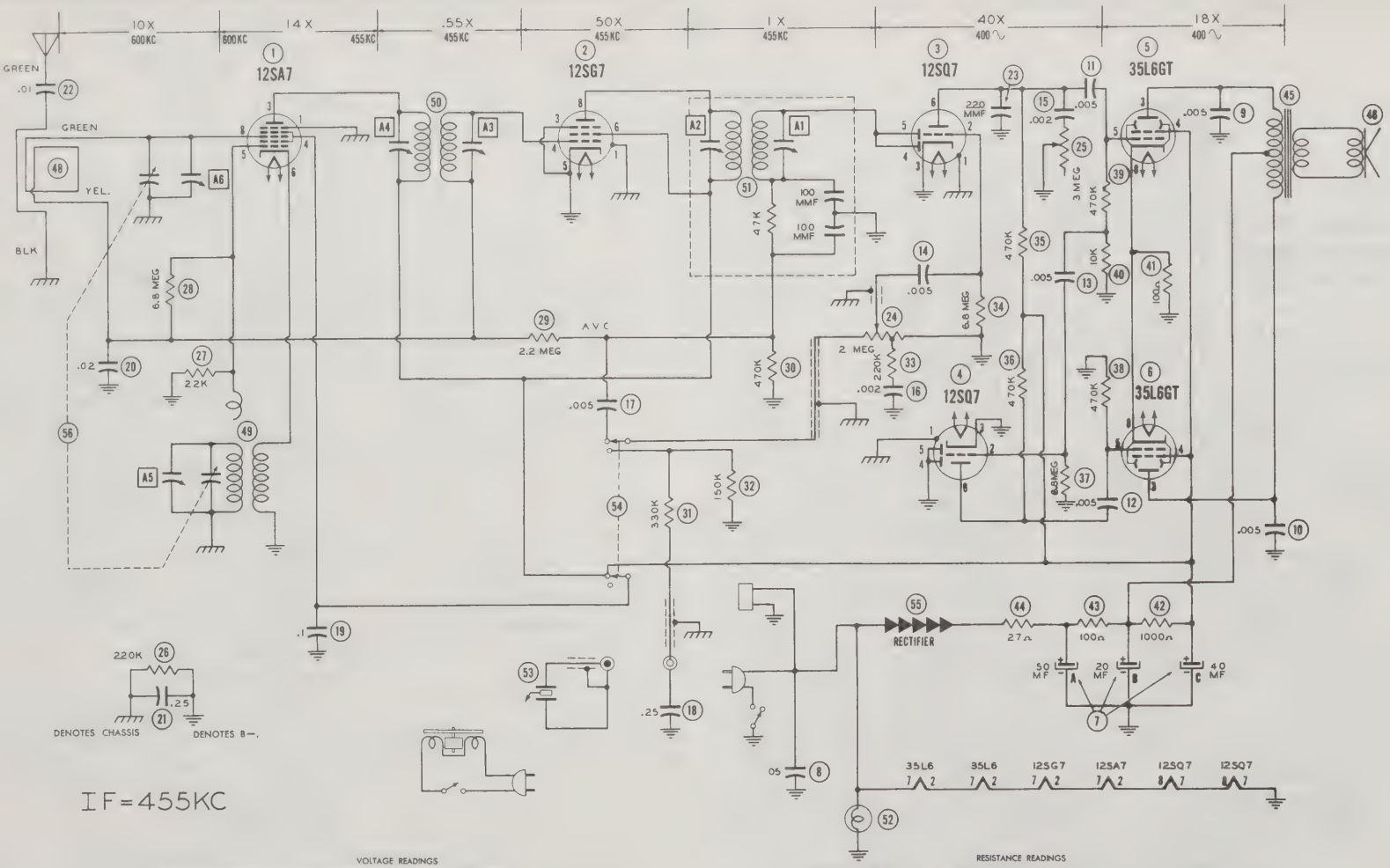


DATE 5/48-#489-11

SET #39-FOLDER #11

CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	0V.	24VAC	102VDC	102VDC	-12VDC§	0V.	37VAC	-.5VDC
2	12SG7	0V.	37VAC	0V.	-.5VDC	0V.	102VDC	48VAC	102VDC
3	[illegible]						55VDC	0V.	12VAC
4	[illegible]							55VDC	12VAC	24VAC
5	[illegible]								83VAC	6.4VDC
6	[illegible]							117VAC	6.4VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	240KΩ	22[illegible]	[illegible]KΩ	[illegible]KΩ	20KΩ	.5Ω	32Ω	2.5 Meg.
2	12SQ7	240KΩ	32[illegible]	0Ω	2.5 Meg.	0Ω	20KΩ	41Ω	20KΩ
3	12SQ7	240KΩ	2 Meg.	0Ω	[illegible]KΩ	500KΩ	480KΩ	0Ω	1ΩΩ
4	12SQ7	240KΩ	2 Meg.	0Ω	0Ω	0Ω	480KΩ	12Ω	28Ω
5	35L6GT	INF.	41Ω	20KΩ	20KΩ	480KΩ	INF.	60Ω	90Ω
6	35L6GT	INF.	60Ω	20KΩ	20KΩ	470KΩ	0Ω	80Ω	90Ω

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of + 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

MANTOLA MODELS
R-75143, R-75343

MANTOLA MODELS
R-75143, R-75343

MANTOLA MODEL R-75143

TRADE NAME	Mantola, Models R-75143, R-75343
SUPPLIER	The B. F. Goodrich Co., 500 S. Main St., Akron, Ohio
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 12SA7GT Converter, 12SK7GT IF Amp., 12SQ7GT Det.-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier
POWER SUPPLY	117 Volts AC-DC
TUNING RANGE—BROADCAST	540-1700KC RATING .245 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer parallel with base of dial.

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to stator of ant. section of gang. Low side to chassis.	456KC	Quiet point at high end of band.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD to reduce hum modulation.
2		Loop	1600KC	1600KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1400KC	Tune in 1400 KC signal.	"	A6	Adjust for maximum output.

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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DATE 5/48-#489-12 SET #39-FOLDER #12

PARTS LIST AND DESCRIPTIONS

MANTOLA MODELS
R-7[illegible], R-7[illegible]

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		MANTOLA PART No.	STANDARD REPLACEMENT		
1	Converter	12SA7GT	12SA7GT	6AD	
2	IF Amp.	12SK7GT	12SK7GT	6N	
3	Det.-AVC-AF	12SQ7GT	12SQ7GT	6Q	
4	Power Output	50L6GT	50L6GT	7AC	
5	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	MANTOLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SPRAGUE PART No.	SOLAR PART No.	
6A	40	150	2-3	PRS150-40-	BRD4215	TA-240	DSB-2x40-150	Filter
B	20	150	(10B143)	40				
7	.1	400		484-.1	DT4P1	TC-1	ST-4-1	Line Bypass
8	.1	400		484-.1	DT4P1	TC-1	ST-4-1	Line Isolating‡
9	.02	400		484-.02	DT4S2	TC-12	ST-4-02	50L6 Plate Bypass
10	.01	400		484-.01	DT4S1	TC-11	ST-4-01	Audio Coupling
11	.01	400		484-.01	DT4S1	TC-11	ST-4-01	" "
12	.05	200		484-.02	DT4S5	TC-15	ST-4-05	AVC Filter
13	250	500		1468-.00025	5W5T25	1FM-325	MO.5-325	Audio Plate Bypass
14	100	500		1468-.0001	5W5T1	1FM-31	MO.5-31	RF Bypass Vol. Cont.
15	100	500		1468-.0001	5W5T1	1FM-31	MO.5-31	Osc. Grid Cond.

‡Used in Underwriters approved models only.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	MANTOLA PART No.	IRC PART No.	CLAROSTAT PART No.	
16A	500K Ω	1	20-1	D13-133	M-60-2	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 16A per instructions
C	Switch		" "	41	SW-A	" " " " "

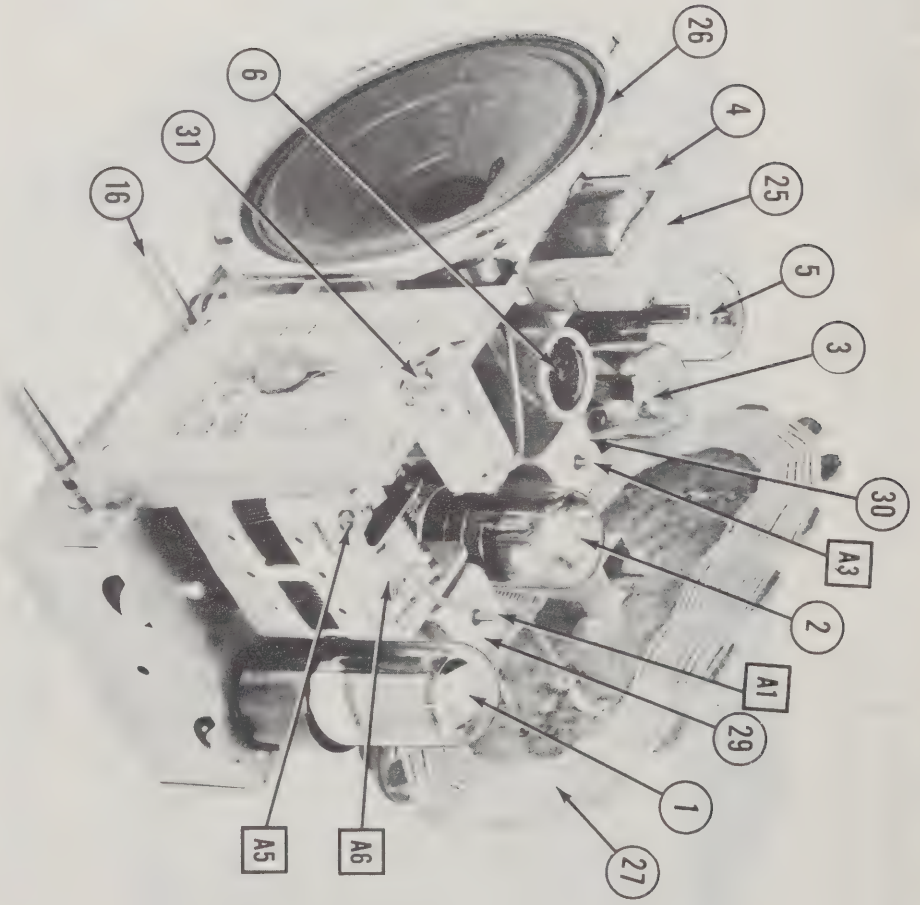
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	MANTOLA PART No.	IRC PART No.	
17	22KΩ	½		BTS-22K	Red-Red-Or. Osc. Grid
18	2.2 Meg.	½		BTS-2.2 Meg.	Red-Red-Grn. Diode Load
19	5.6 Meg.	½		BTS-5.6 Meg.	Blue-Blk.-Grn. 1st AF Grid
20	560KΩ	½		BTS-560K	Grn.-Blue-Yl. 1st AF Plate Load
21	560KΩ	½		BTS-560K	Grn.-Blue-Yl. Output Grid
22	150Ω	½		BW-½-150	Br.-Grn.-Br. Output Cathode
23	2200Ω	1		BW-1-2200	Red-Blk.-Red Filter
24	1KΩ	½		BW-½-10	Br.-Blk.-Blk. Pilot Light Ballast

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		MANTOLA PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
25	2500Ω	3.1Ω	145Ω	.38Ω		A-3876#	T22S45#	A-2928#	#Bend mounting tabs down and mount by original bracket.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: MANTOLA PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
26	FIELD PM	VC IMP. 3.16Ω	8-1	ST-105* Mod. P5-X	5A1*	*Fabricate new mounting bracket.
27	CONE DIA. 4½"	VC DIA. 1"				

R F COILS

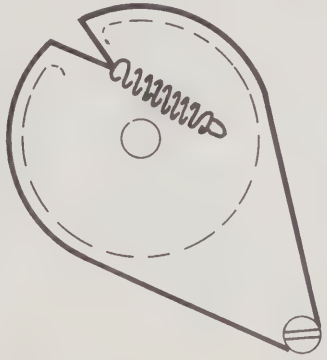
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: MANTOLA PART No.	MEISSNER PART No.	
28	Loop Ant.	1Ω		32-3		
29	Osc. Coil	1Ω	5.2Ω	14-1		
30	Input IF	10Ω	10Ω	15-3		
31	Output IF	10Ω	10Ω	15-3		

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: MANTOLA PART No.		INSTALLATION NOTES
32	Bayonet	6-8	.15	Brown			Type 47

MISCELLANEOUS

ITEM No.	PART NAME	MANTOLA PART No.	NOTES
33	2 Gang Var. Cap. Dial Pointer Dial Plate	6-1 720-3D 1-2	

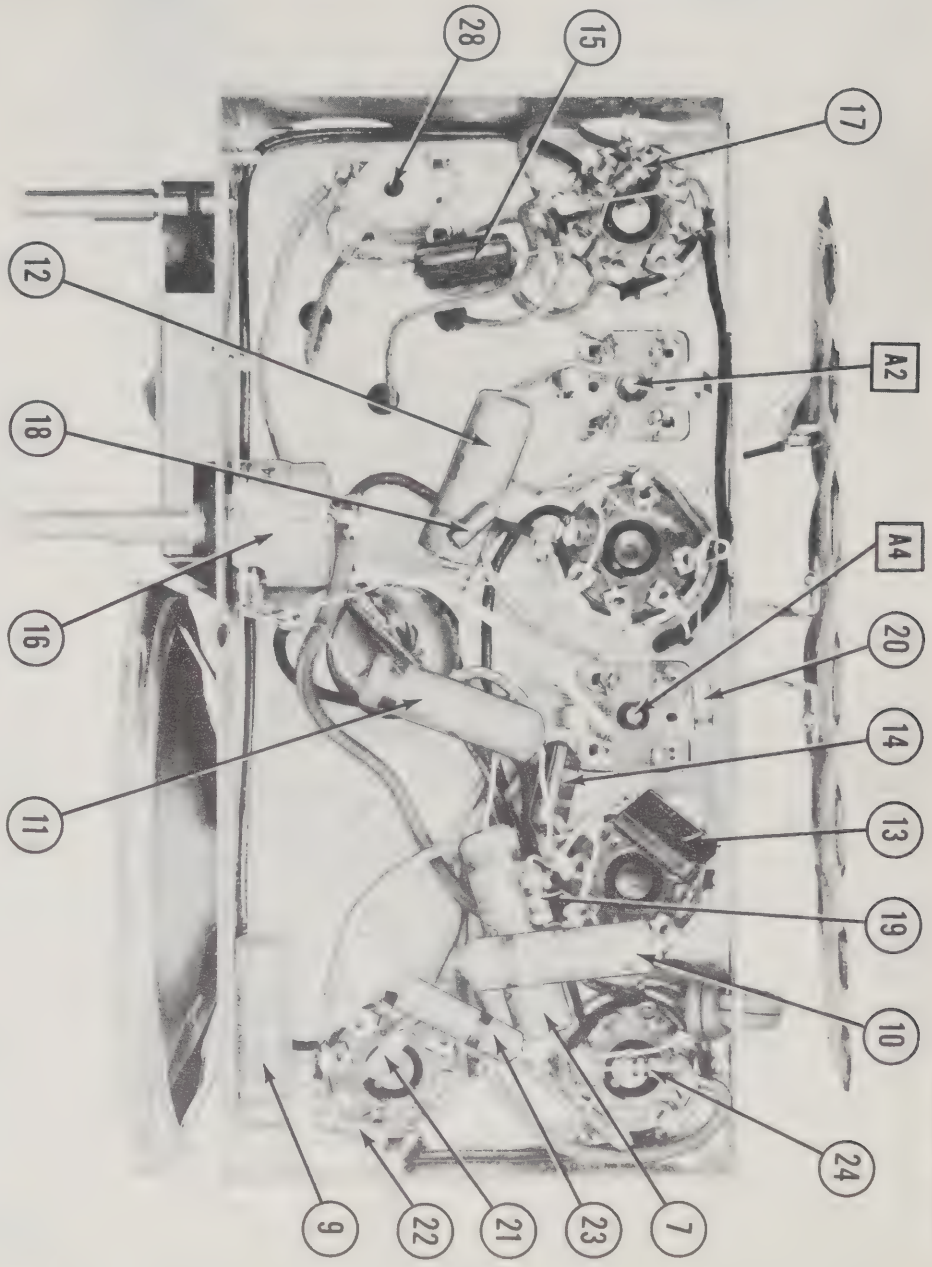


2 1/2 TURNS

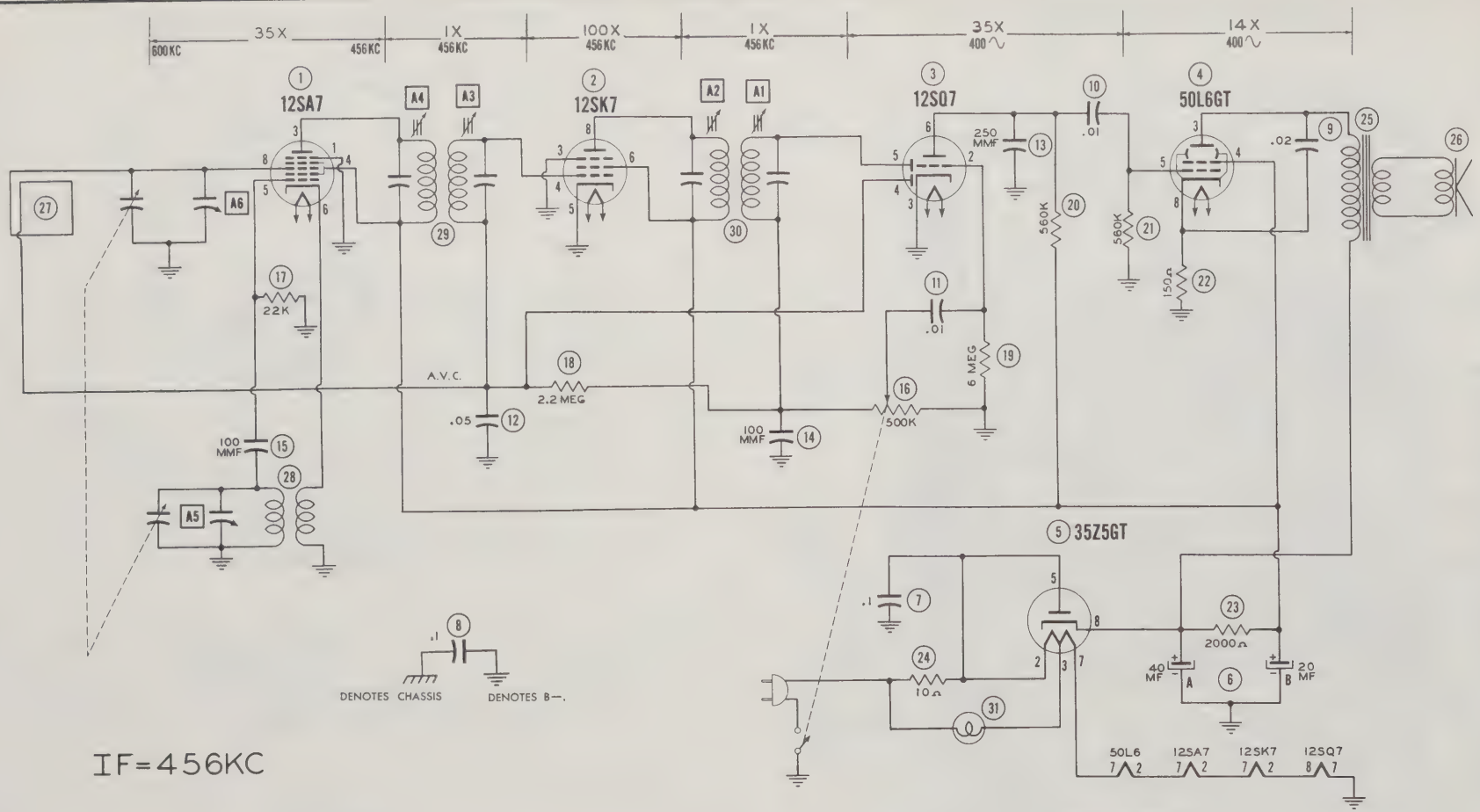
DIAL CORD DRIVE

DATE 1/4-#4-52-12 SET #39-FOLDER #12

CHASSIS—BOTTOM VIEW



MANTOLA MODELS R-75143, R-75542



IF=456KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7GT	0V.	27VAC	80VDC	80VDC	-9VDC§	0V.	40VAC	-.67VDC
2	12SK7GT	0V.	13.5VAC	0V.	-.67VDC	0V.	80VDC	27VAC	80VDC
3	12SQ7GT	0V.	-.6VDC	0V.	-.67VDC	-.42VDC	45VDC	13.5VAC	0V.
4	50L6GT	0V.	40VAC	125VDC	80VDC	0V.	0V.	88VAC	4.4VDC
5	35Z5GT	0V.	116VAC	113VAC	0V.	116VAC	117VAC	88VAC	130VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7GT	0Ω	27Ω	3 Meg.	3 Meg.	[illegible]	[illegible]	[illegible]	[illegible]
2	12SK7GT	0Ω	14Ω	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	12SQ7GT	0Ω	6 Meg.	0Ω	3 Meg.	47Ω	[illegible]	1Ω	0Ω
4	50L6GT	INF.	40Ω	[illegible]	[illegible]	[illegible]	[illegible]	1.2Ω	1Ω
5	35Z5GT	0Ω	135Ω	130Ω	INF.	135Ω	135Ω	100Ω	3 Meg.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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489-12

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

MOTOROLA
MODEL 508

MOTOROLA
MODEL 508

MOTOROLA MODEL 508

TRADE NAME	Motorola, Model 508
MANUFACTURER	Motorola Inc., 4545 Augusta Blvd., Chicago, Ill.
TYPE SET	Battery Operated Universal Automotive Superheterodyne Receiver
TUBES (SIX)	Types, 6BA6 RF Amp., 6BE6 Converter, 6BA6 IF Amp., 6AT6 Det.-AVC-AF, 6V6GT Power Output, 6X4 Rectifier.
POWER SUPPLY	6 Volt Storage Battery
TUNING RANGE—BROADCAST	535-1600KC RATING 6.3 Amp. @ 6.3 Volts DC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	high side to Pin 7 6BE6. Low side to chassis.	455KC	Tuning control fully clockwise.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output.
2	50 MMFD and 21" coaxial lead. Capacitor at gen. end	Antenna receptacle.	1600KC	Tuning control fully clockwise. Cores are to project 1-1/8" from ends of cans and tuning control against stop.	"	A5,A6, A7	Adjust for maximum output in order given.
3	"	"	1425KC	Exactly one full turn from high freq. end	"	A8,A9, A10	Adjust cores for maximum output. Mark manual tuning shaft coupling to indicate full turn.
4	"	"	Gen. power off but leave connected.	Four more full turns in.	"	A11	Adjust for maximum noise.
5				1400KC		A7	Install set in car and connect antenna. Adjust for maximum noise.

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1948 by Howard W. Sams & Co., Inc., Indianapolis, Indiana, U. S. A. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

MOTOROLA MODEL 5U8

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	6BA6	6BA6	7BK	
2	Converter	6BE6	6BE6	7CL	
3	IF Amp.	6BA6	6BA6	7BK	
4	Det.-AVC-AF	6AT6	6AT6	7BT	
5	Power Output	6V6GT	6V6GT	7AC	
6	Rectifier	6X4	6X4	5BS	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7A	30	250	23A47301		UPT245C	DY-312	EL-32	■ Filter
B	30	30*			BR104P	M-10-450	"	▲ "
C	20	25					TA-25	Output Cathode Bypass
8	.5	100	8A17028					Hash Filter
9	.5	100	8A17028					" "
10	.006	1000	8A12840	1684-006	MD16D6	STM-16-006	TC-26	Buffer
11	.01	400	8K23690	484-01	DT4S1	ST-4-01	TC-11	Tone Comp.
12	.03	400	8A71911	484-03	DT4S3	ST-4-03	TC-13	Audio Coupling
13	.05	100	8A13514	484-05	DT4S5	ST-4-05	TC-15	" "
14	.05	100	8A13514	484-05	DT4S5	ST-4-05	TC-15	Cathode Bypass
15	.1	400	8K13166	484-.1	DT4P1	ST-4-1	TC-1	Decoupling
16	.05	400	8A14791	484-05	DT4S5	ST-4-05	TC-15	Screen Bypass
17	.05	100	8A13514	484-05	DT4S5	ST-4-05	TC-15	AVC Filter
18	.006	100	8A4529	484-006	DT6D6	ST-6-006	TC-26	RF Coupling
19	1000		21K478410	1468-001	1W5D1	M0.5-21	1FM-21	AF Plate Bypass
20	50		21K74661	1468-00005	5W5Q5	M0.5-45	1FM-45	IF Coupling-Cer.
21A	100		*	1468-0001	5W5T1	M0.5-31	1FM-31	Diode RF Filter-Cer.
B	100		*	1468-0001	5W5T1	M0.5-31	1FM-31	" " " "
22	50		21K74661	1468-00005	5W5Q5	M0.5-45	1FM-45	Osc. Grid Cap.-Cer.
23	400		21A71872	1469-0004	5R5T4	M0S.5-34	MS-34	Fixed Trimmer-Cer.
24	5		21K70720	1468-000005	5W5V5	M0.5-55	MS-55	RF Coupling-Cer.
25	100		21B77562	1468-0001	5W5T1	M0.5-31	1FM-31	Fixed Trimmer-Cer.

*Items 21A, 21B & 47 may be obtained as one unit under Part No. 21A472571.

CONTROLS

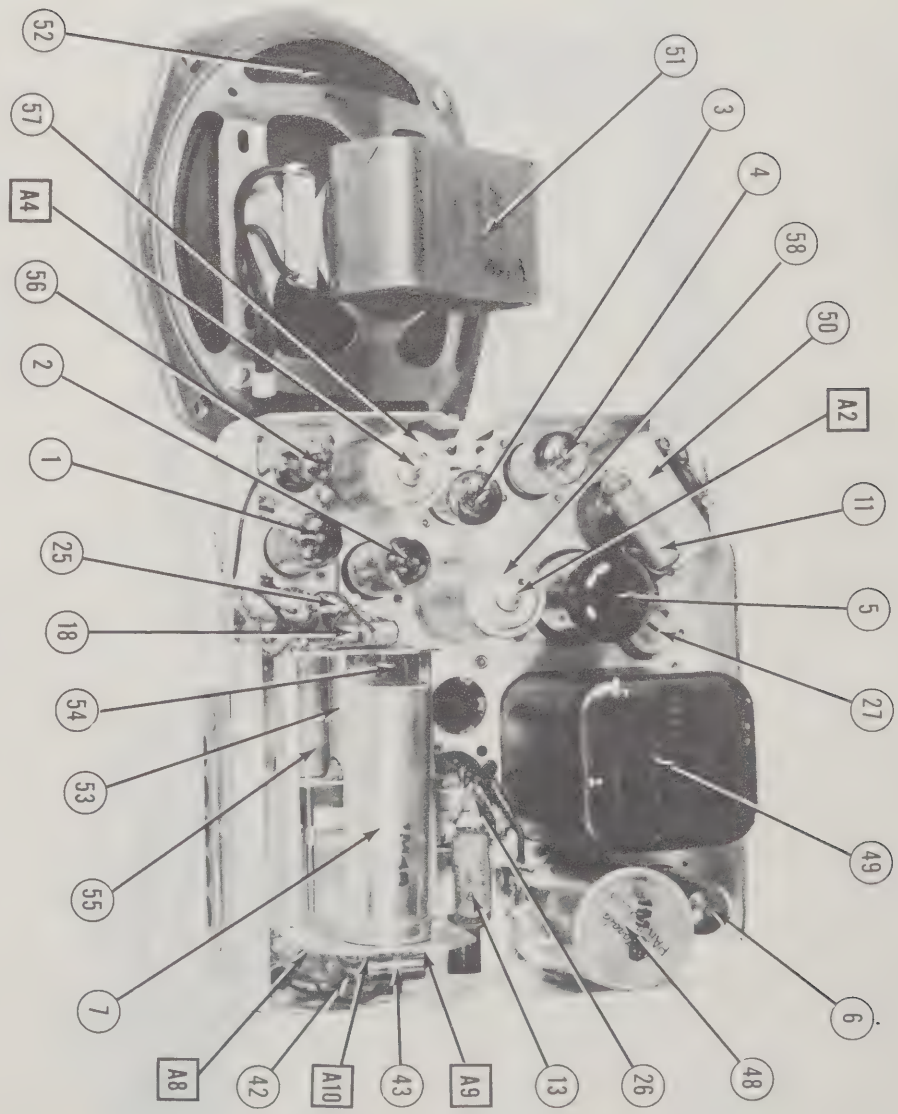
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
26A	500KΩ		1A47[illegible]61	D1[illegible]-133		Volume Control
B	Shaft		Not Req.	A & C21		Attach to 26A per instructions
C	Switch		"	41		" " "
27	7500	1	18K77552			Sensitivity Control

†Use part of original shaft with coupler.

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	IDENTIFICATION CODES
28	47KΩ	½	6R3[illegible]	BT-470K	Y1.-V1.-Y1. RF Grid
29	150Ω	½	6R3992	BW-½-150	Br.-Grn.-Br. RF Cathode
30	100KΩ	½	6R6075	BTS-100K	Br.-Blk.-Y1. Converter Grid
31	47K	½	6R[illegible]	BTS-47K	Y1.-V1.-Or. Oscillator Grid
32	10K	½	6R[illegible]	BT-C-10K	Br.-Blk.-Or. Screen Dropping
33	330Ω	½	6R6010	BW-½-330	Br.-Grn.-Br. IF Cathode
34	150Ω	½	6R3992	BW-½-150	Or.-Or.-Br. Decoupling
35	68KΩ	½	6R6001	BTS-68K	Blue-Gray-Or. Cathode Dropping
36	1 Meg.	½	6R6004	BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
37	1500Ω	½	6R6161	BTS-1500	Br.-Grn.-Red AF Cathode
38	3.3 Meg.	½	6R2118	BTS-3.3 Meg.	Or.-Or.-Grn. AF Grid
39	470KΩ	½	6R6032	BTS-470K	Y1.-V1.-Y1. AF Plate Load
40	1 Meg.	½	6R6004	BTS-1 Meg.	Br.-Blk.-Grn. Diode Load
41	22KΩ	½	6R[illegible]	BTS-220K	Red-Red-Or. Output Grid

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	MOTOROLA PART No.	IRC PART No.	
42	270Ω	1	6R6336	BW-1-270	Red-Vi.-Br. Output Cathode
43	1000Ω	2	6R6054	BT-2-1000	Br.-Blk.-Red Filter
44	10K	2	6R6054	BTS-10K	Br.-Blk.-Or. Hash Suppression
45	56Ω	2	6R5614	BW-2-56	Grn.-Blue-Blk. " "
46	56Ω	2	6R5614	BW-2-56	Grn.-Blue-Blk. " "
47	47kΩ	2	*	BTS-47K	Yl.-Vi.-Or. Diode RF Filter

*Items 47, 21A & 21B may be obtained as one unit under Part #21A472571.

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA		INSTALLATION NOTES
				MOTOROLA PART No.	RADIART PART No.	
43	Interrupter	6.3	115∿	48B3333	5342M	

TRANSFORMER (VIBRATOR)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	MOTOROLA PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
48	6V DC @ 4.0A	540V CT @ .06A			25B472533			

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		MOTOROLA PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
50	7800Ω	3.2Ω	368Ω	.6Ω	25B70171	A-3879	T22S47	A-2981	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			MOTOROLA PART No.	JENSEN PART No.	QUAM PART No.	
1A	FIELD	VC IMP.		ST-110		
SPEAKER	PM	3.2Ω	50B473783 50B473118 50B473119 50B473696 50B473697	Mod. P6-V	6A21	Alternate Speaker " " " " " "
	CONE DIA.	VC DIA.				
52	6"	3/4"				

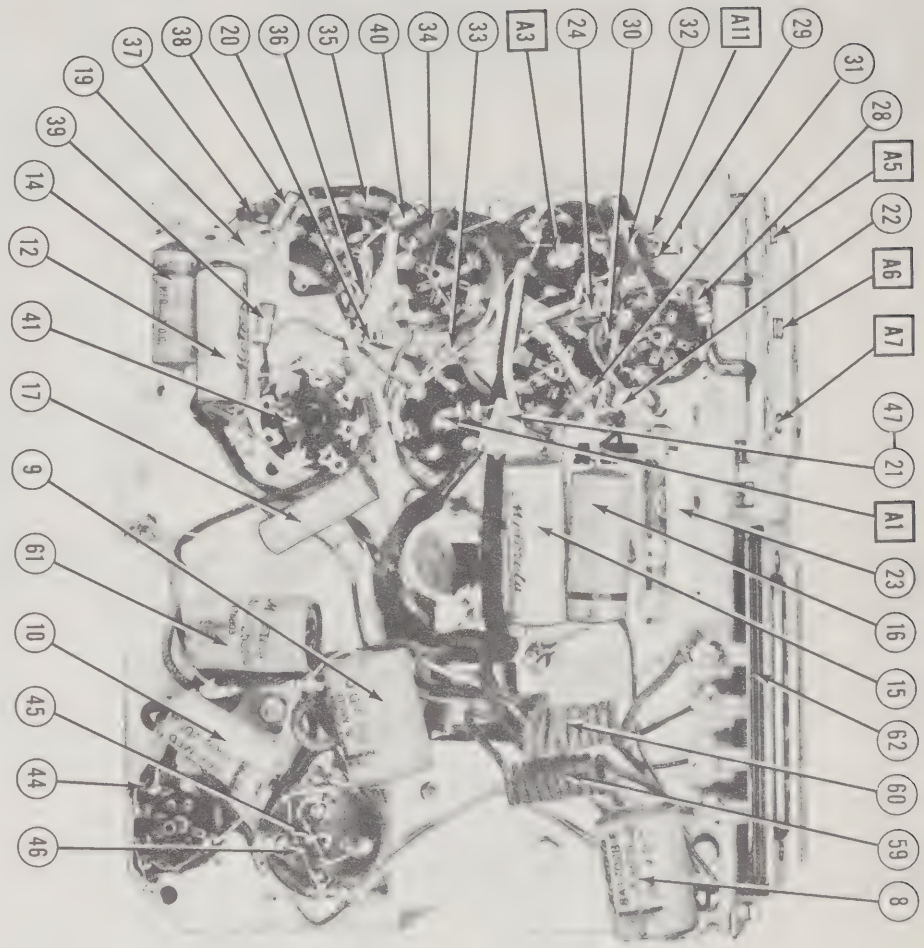
R F COILS

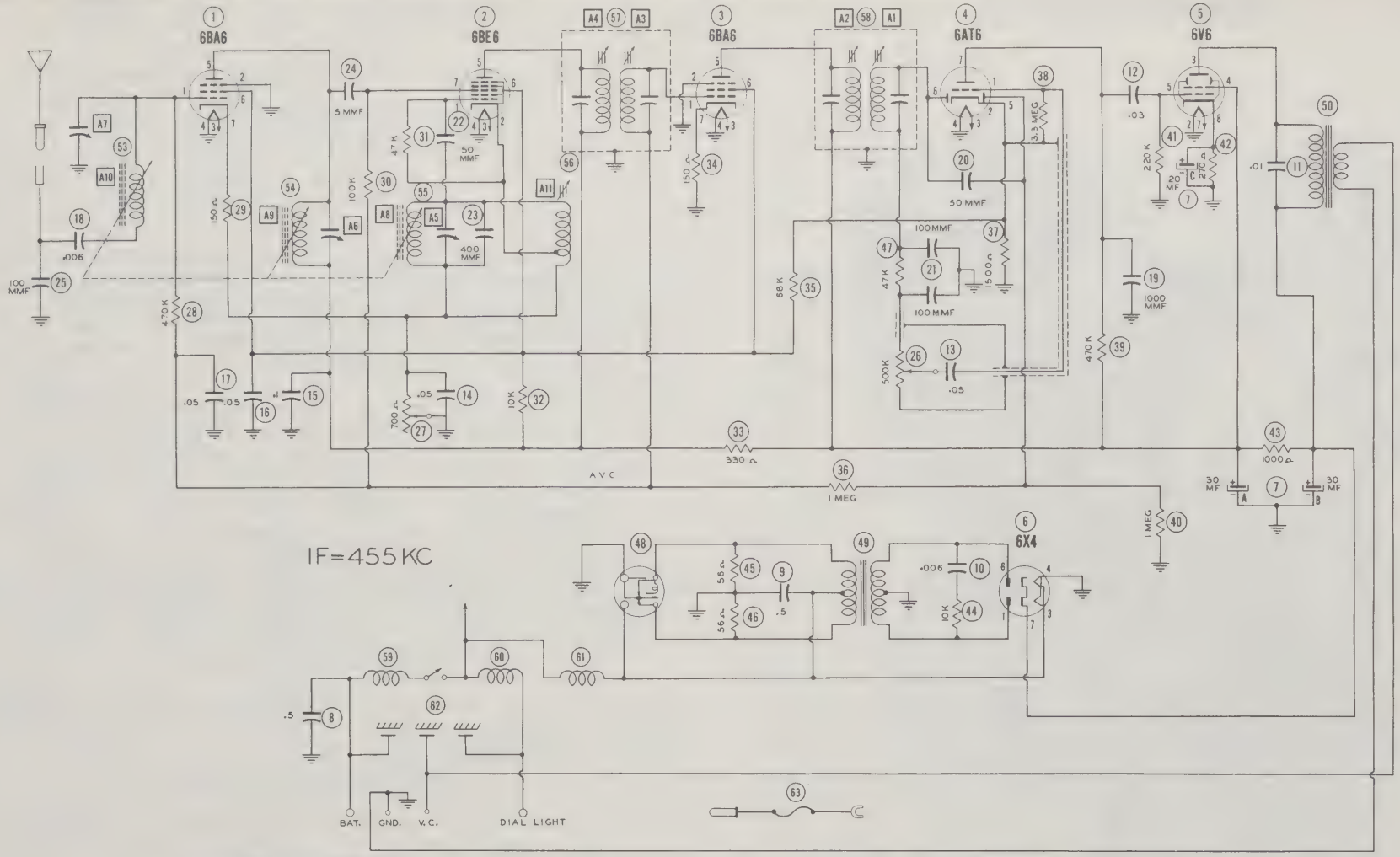
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	MOTOROLA PART No.	MEISSNER PART No.	
53	Ant. Coil		11Ω	24B71881		Items 53, 54 and 55 are slug tuned and ganged together.
54	RF Coil		11Ω	24B71881		
55	Osc. Coil		2.8Ω	24B71879		
56	Osc. Pad Coil		2.8Ω	24B70227		
57	Input IF	20Ω	20Ω	24B76553		
58	Output IF	20Ω	20Ω	24B76553		
59	Hash Choke		0Ω	24A472535		
60	" "		0Ω	24A472535		
61	" "		0Ω	25R73026		

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
62	Spark Plate	1A73041	
60	Fuse	65A10266	10 Amp. (3AG)
A5	Trimmer Strip	20B77538	Osc. Adj.
A6			RF Adj.
A7			Ant. Adj.
	Manual Tuner	1A4722	

CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	[illegible]								-
2	6BE6	-6VDC§	0V.	6.3VDC	0V.	195VDC	74VDC	0V.	-
3	6BA6								-
4	[illegible]								
5	[illegible]			215VDC	200VDC	0V.	0V.	6.3VDC	10VDC
6	[illegible]			6VDC	0V.	250VAC	270VAC	230VDC	-

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	[illegible]								-
2	6BE6	47KΩ	.5Ω	.5Ω	0Ω	50KΩ	60KΩ	2.1 MEG.	-
3	6BA6	2 MEG.	0Ω	.5Ω	0Ω	50KΩ	60KΩ	150Ω	-
4	6AT6	3.3 MEG.	1.5KΩ	.5Ω	0Ω	1 MEG.	540KΩ	520KΩ	-
5	6V6GT	INF.	0Ω	50KΩ	50KΩ	220KΩ	INF.		-
6	6X4	[illegible]	INF.			1 K			-

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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489-13

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Battery voltage maintained at 6.3 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - Volume and sensitivity control at maximum, no signal applied for voltage measurements.

MOTOROLA MODEL 608

TRADE NAME	Motorola, Model 608
MANUFACTURER	Motorola Inc., 4545 Augusta Blvd., Chicago, Ill.
TYPE SET	Battery Operated Universal Automotive Superheterodyne Receiver with Loop Antenna
TUBES (SIX)	Types, 6BA6 RF Amp., 6BE6 Converter, 6BA6 IF Amp., 6AT6 Det.-AVC-AF, 6V6GT Power Output, 6X4 Rectifier.
POWER SUPPLY	6 Volt Storage Battery
TUNING RANGE—BROADCAST	535-1600KC RATING 6.6 Amp. @ 6.3 Volts DC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Set sensitivity control to give 2 volts bias ±.
Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 7 (Grid) 6BE6. Low side to chassis.	455KC	Tuning control fully clockwise.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output.
2	60MMFD. and 21" coaxial lead. Capacitor at gen. end	Antenna receptacle.	1605KC	High freq. end cores are to be projecting 1-1/8" from ends of cans and tuning control against stop.	"	A5,A6, A7	Adjust for maximum output in order given.
3	"	"	1425KC	Turn tuning control to set carriage plate 1-43/64" from coil shield plate.	"	A8,A9, A10	Adjust cores for maximum output.
4	"	"	Gen. power off but leave connected.	Turn tuning control to set carriage plate 27/32" from coil shield plate.	"	A11	Adjust for maximum noise. If it is necessary to turn A11 more than ½ turn Steps 2, 3 and 4 must be repeated until A11 can be peaked with less than ½ turn. Then adjust sensitivity control to give 1 watt (1.8 volts on output meter) at 600KC with 1.3 microvolts input from sig. gen.
5				1400KC		A7	Install set in car and connect antenna adjust for maximum noise.

MOTOROLA
MODEL 608

MOTOROLA
MODEL 608

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: MOTORCLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	6BA6	6BA6	[illegible]	
2	Converter	6BE6	6BE6	[illegible]	
3	IF Amp.	6BA6	6BA6	[illegible]	
4	Det.-AVC-AF	6AT6	6AT6	[illegible]	
5	Power Output	6V6GT	6V6GT	[illegible]	
6	Rectifier	6X4	6X4	[illegible]	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MOTORCLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7A	20	350	20A475-1F		MFL 40 C	DY-[illegible]	EL-32	■ Filter
B	30	300			BR1045	M-10-450		▲ "
C	20	25					TA-2[illegible]	Osc. & Ctrl. Grid Bypass
[illegible]	.1	100	8A17[illegible]					Hash Filter
[illegible]	.1	100	8A19133					" "
10	.1	100	8A19133					" "
11	.05	400	8A[illegible]	[illegible]	MD 4D6	ST-4-[illegible]	TA-2[illegible]	Buffer
12	.005	500	8A71910	484-006	DT6D6	ST-6-006	TC-26	Tone Compensation
13	.005	400	8A71910	484-004	DT6D4	ST-6-004	TC-24	" "
14	.1	100	8A472035	484-1	DT4P1	ST-4-1	TC-1	Muting Cap.
15	.01	400	8A71911	484-03	DT4S3	ST-4-03	TC-13	Audio Coupling
16	.02	100	A[illegible]14	[illegible]	DT4S[illegible]	ST-4-[illegible]	TC-1[illegible]	" "
17	.005	100	8A4529	484-006	DT6D6	ST-6-006	TC-26	Tone Compensation
18	.05	600	8A14791	484-05	DT4S5	ST-4-05	TC-1[illegible]	Screen Bypass
19	.05	400	8A14791	484-05	DT4S5	ST-4-05	TC-15	Screen Bypass
20	.1	400	8K13166	484-1	DT4P1	ST-4-1	TC-1	Decoupling
21	.05	150	A[illegible]14	[illegible]	DT4S[illegible]	ST-4-[illegible]	TC-1[illegible]	Cathode Bypass
22	.006	100	8A4529	484-006	DT6D6	ST-6-006	TC-26	RF Coupling
23	1000	350	21K478410	1468-001	1W5D1	MO.5-21	1FM-21	AF Plate Bypass
24A	100	500	*	1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter-Cer.
B	100	350	*	1468-0001	5W5T1	MO.5-31	1FM-31	" " " "
25	100	350	21R6513	1468-00005	5W5Q5	MO.5-45	1FM-45	Diode Coupling " "
26	400	500	21A71872	1469-0004	5R5T4	MOS.5-34	MS-34	Fixed Trimmer " "
27	50	350	25R6513	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap. " "
28	50	500	21K70720	1468-000005	5W5V5	MO.5-55	MS-55	RF Coupling " "
29	100	500	21B77562	1468-0001	5W5T1	MO.5-31	1FM-31	Fixed Trimmer "

* Items 24A, B and 54 can be obtained as one unit under Part No. 21A472571.

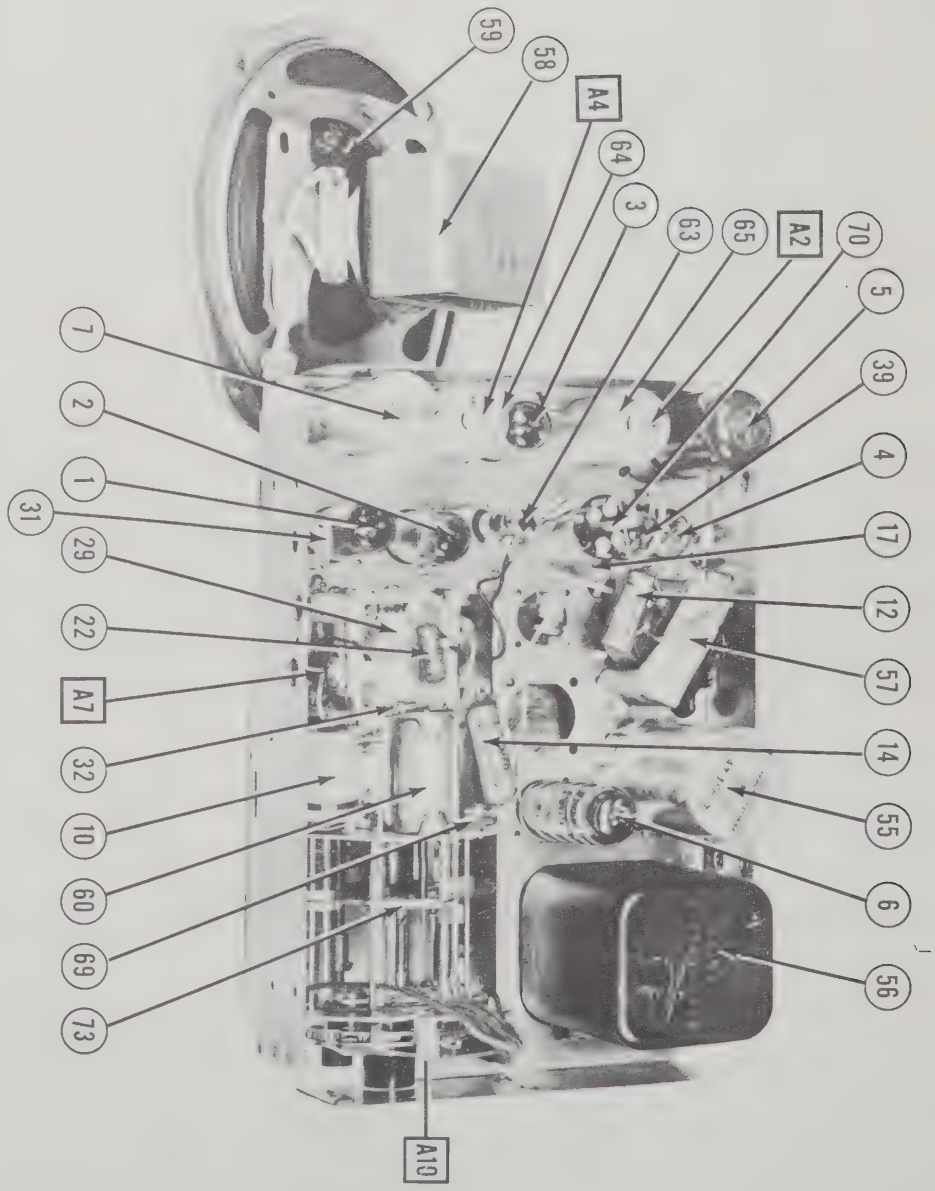
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
30A	[illegible] ohms	[illegible]	18A480773	D1[illegible]-1[illegible]	[illegible]-[illegible]-[illegible]	Volume Control
B	[illegible] shaft		Not Req.	"	Not Req.	Attach to 30A per instructions
C	[illegible] switch		" "	41	" "	" " " "
31		1	18K[illegible]			Sensitivity Control

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	IDENTIFICATION CODES
32	470KΩ	½	6R6032	BTS-470K	Yl.-Vi.-Yl. RF Cath[illegible]
33	150Ω	½	6R3092	BW-½-150	Br.-Grn.-Br. RF Cathode
34	100KΩ	½	6R6075	BTS-100K	Br.-Blk.-Yl. Converter [illegible]
35	47KΩ	½	6R6056	BTS-47K	Yl.-Vi.-Or. Oscillator [illegible]
36	10KΩ	2	6R476060	BT-2-10K	Br.-Blk.-Or. Screen Dr[illegible]
37	330Ω	½	6R6010	BW-½-330	Or.-Or.-Br. Decoupling
38	68KΩ	½	6R6001	BTS-68K	Blue-Gray-Or. Cathode Droppin[illegible]

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	MOTOROLA PART No.	IRC PART No.	
39	100KΩ	½	6R6075	BTS-100K	Br.-Blk.-Yl. Tone Control
40	150Ω	½	6R3952	BW-½-150	Br.-Grn.-Br. IF Cathode
41	1 Meg.	½	6R6004	BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
42	1 Meg.	½	6R6004	BTS-1 Meg.	Br.-Bl.-Grn. Diode Load
43	150Ω	½	6R6181	[illegible]	Br.-Grn.-Br. 1st AF Cathode
44	470KΩ	½	6R6032	[illegible]	Yl.-V.-Yl. AF Plate Load
45	1 Meg.	½	6R6004	BTS-1 Meg.	Br.-Blk.-Grn. AF Grid
46	2.2 Meg.	½	6R3927	BTS-2.2 Meg.	Red-Red-Grn. Mute Network
47	220KΩ	½	6R6015	BTS-220K	Red-Red-Yl. Output Grid
48	270Ω	1	6R6336	BW-1-270	Red-Vi.-Br. Output Cathode
49	1000Ω	2	6R476004	BT-2-1000	Br.-Blk.-Red Filter
50	10KΩ	½	6R6054	BTS-10K	Br.-blk.-Or. Hash Suppressor
51	56Ω	½	6R5614	BW-½-56	Grn.-Blue-Blk. " "
52	56Ω	½	6R5614	BW-½-56	Grn.-Blue-Blk. " "
53	470Ω	½	6R3949	BTS-470	Yl.-Vi.-Br. Bias
54	47KΩ	½	*	BTS-47K	Yl.-Vi.-Or. Diode RF Filter

Note- Items 54 and 24A & B can be obtained as one unit under Part #21A47-71.

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA		INSTALLATION NOTES
				MOTOROLA PART No.	RADIART PART No.	
55	Interrupter	6.3	115∿	48B3333	5342M	

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	MOTOROLA PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
56	6VDC @ 4.1A	.4 VCT @ .062A			25B472533	P-4062†	T22R22†	P-2[illegible]†

†Drill new mounting holes.

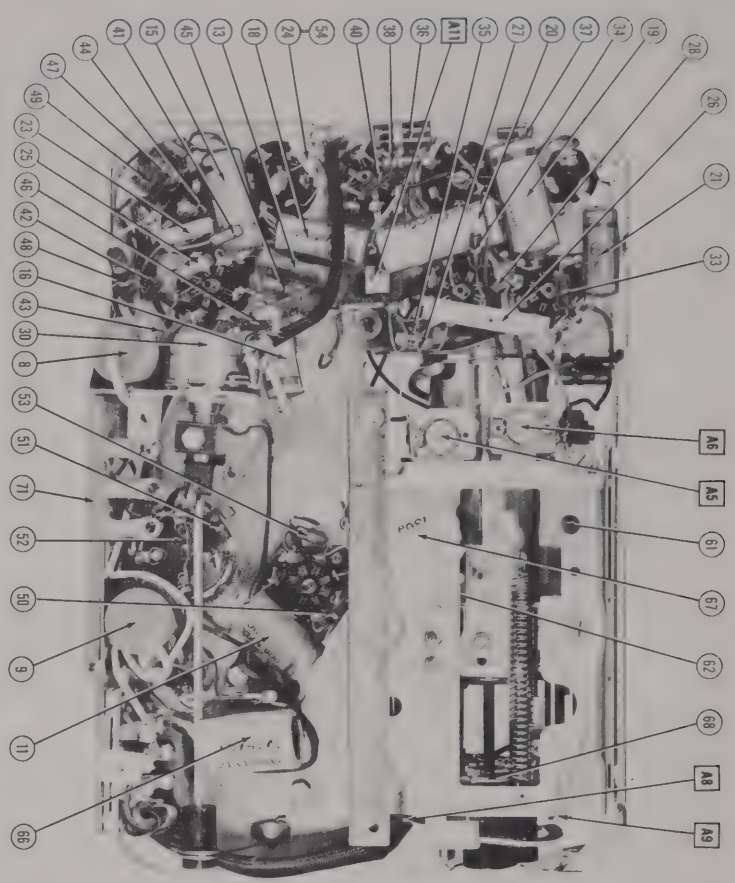
TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		MOTOROLA PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
57	7800Ω	3.2Ω	360Ω	.02	25B70171	A-3879	T22S47	A-2931	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			MOTOROLA PART No.	JENSEN PART No.	QUAM PART No.	
58A	FIELD	VC IMP.		ST-110		
B	PM	3.2Ω	50B473783	Mod. P6-V	6A21	
C			50B473696			Alternate Speaker
D			50B473697			" "
E			50B473119			" "
			50B473119			
	CONE DIA.	VC DIA.				
59	6"	3/4"				

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	MOTOROLA PART No.	MEISSNER PART No.	
60	Ant. Coil		11Ω	24B71881		Items 60, 61, 62 are slug tuned and ganged together.
61	RF Coil		11Ω	24B71881		
62	Osc. Coil		2.8Ω	24B71879		
63	Osc. Pad. Coil		2.8Ω	24B70227		
64	Input IF	20Ω	20Ω	24B76553		
65	Output IF	20Ω	20Ω	24B76553		
66	Hash Choke		0Ω	24A472535		

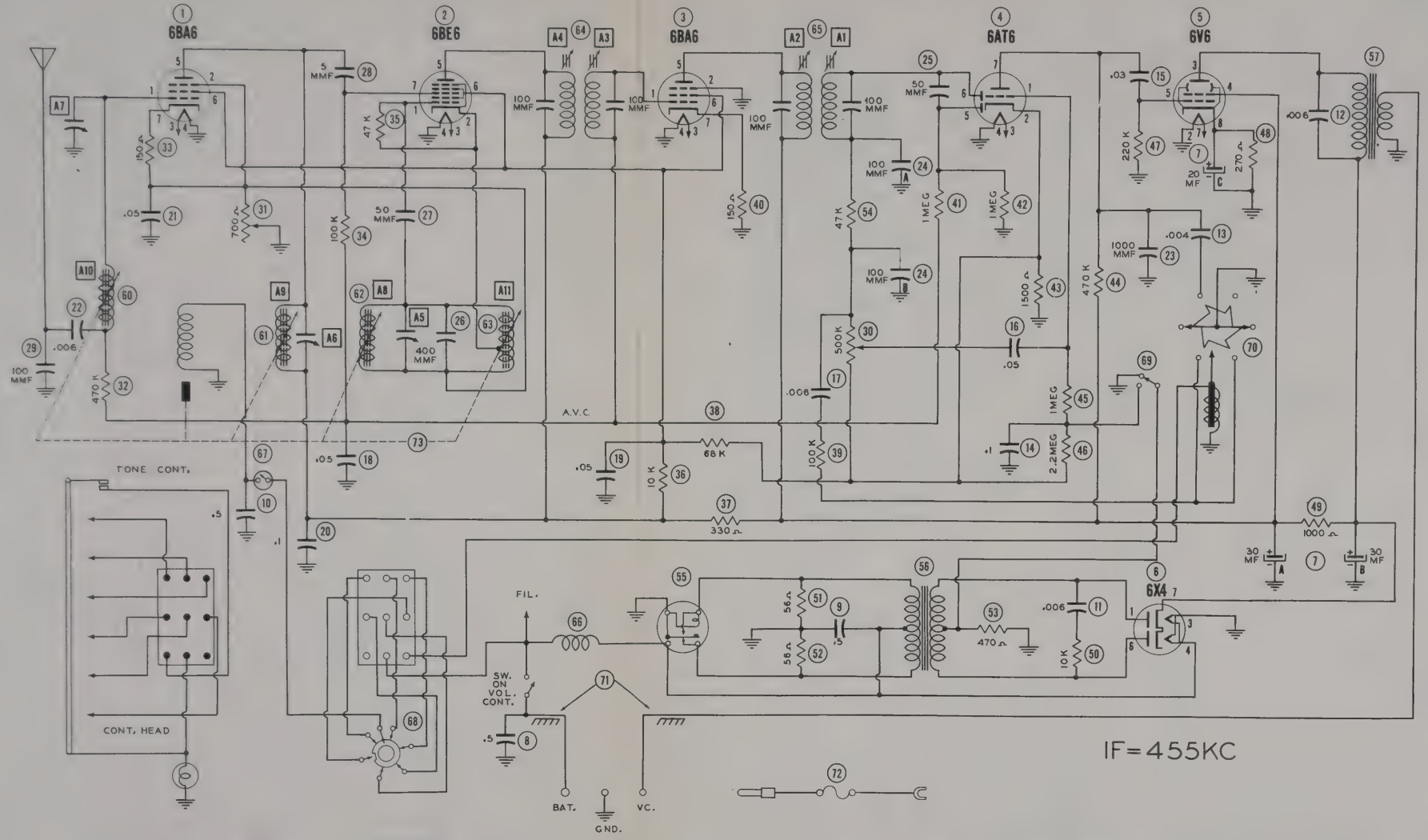
MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
67	Switch	1B70944	Solenoid
68	"	40B70952	Selector
69	"	40A472644	Mute
70	Relay	1X78040	Tone
71	Spark Plate	1A472624	
72	Fuse	65K4637	20 Amp. (3AG)
73	Tuner Assby.	1X472634	
74	Button		Set-up
75	Knob	38A71874	"
A5	Trimmer Strip	20K472613	Osc. Adj.
A6			RF Adj.
A7			Ant. Adj.

PUSHBUTTON ADJUSTMENTS

1. Turn set on and allow to warm up for at least five minutes.
2. Collapse antenna until signal is weak.
3. Press manual "M" button on control head.
4. Turn tuning knob until desired station is tuned in.
5. Press desired button and hold in until tuning mechanism completes its operation.
6. Press "set-up button" (74) until click is heard.
7. Turn "set-up knob" (75) until previously noted program is heard. This station is now set up.
8. Repeat steps 3 to 7 for each additional station desired.

DATE 5/48-#469-14 SEC #39-FOLDER #14



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	[illegible]	[illegible]	[illegible]	[illegible]	0V.	212VDC	82VDC	1.5VDC	-
2	[illegible]	[illegible]	[illegible]	[illegible]	0V.	212VDC	82VDC	0V.	-
3	[illegible]	[illegible]	[illegible]	[illegible]	0V.	217VDC	83VDC	2VDC	-
4	[illegible]	[illegible]	[illegible]	[illegible]	0V.	0V.	-.5VDC	65VDC	-
5	[illegible]	[illegible]	[illegible]	[illegible]	0V.	0V.	0V.	6.3VDC	10VDC
6	[illegible]	[illegible]	[illegible]	[illegible]	6VDC	250VAC	270VAC	340VDC	-

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6BA6	2.5 Meg.	0Ω	.5Ω	0Ω	50KΩ	60KΩ	170Ω	-
2	6BE6	47KΩ	.5Ω	.5Ω	0Ω	50KΩ	60KΩ	2.1 Meg.	-
3	6BA6	2 Meg.	0Ω	.5Ω	0Ω	50KΩ	60KΩ	150Ω	-
4	6AT6	3.1 Meg.	1.5KΩ	.5Ω	0Ω	1 Meg.	50KΩ	520KΩ	-
5	6V6GT	50KΩ	0Ω	50KΩ	50KΩ	220KΩ	INF.	.5Ω	70Ω
6	6X4	400Ω	0	0Ω	.5Ω	10KΩ	370	50KΩ	-

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Battery voltage maintained at 6.3 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - All controls at minimum, proper output load connected.

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106

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	6AG5	6AG5	7BD	
2	Converter	7F8	7F8	8BW	
3	1st IF Amp.	6BA6	6BA6	7BK	
4	2nd IF-AM Det.-AVC	7R7	7R7	8AE	
5	FM Det.-1st Audio	7X7	7X7	8BZ	
6	Phase Inv.	7A4	7A4	5AC	
7	Power Output	6V6GT	6V6GT	7AC	
8	" "	6V6GT	6V6GT	7AC	
9	Rectifier	5AZ4	5AZ4		

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
10	20	450	30-2555	AF4J	UP2045	DY-20-450	EL-2	Filter
11A	25	450	30-2570-11	AF88J	UP3345	DY-2x30-450	EL-240	▲ "
B	25	450						▲ "
12	5	50	30-2417	PRS-150-4	BR550	M-4-150	TA-55	Stabilizing Cap.
13	.01	600	61-0120	484-01	DT6S1	MPH-6-01	TC-11	Line Filter
14	.01	600	61-0120	484-01	DT6S1	MPH-6-01	TC-11	" "
15	.003	1000	61-0117	484-003	DT6D3	ST-6-003	TC-23	Output Plate Bypass
16	.006	400	43-3500-7	484-006	DT6D6	ST-6-006	TC-26	Audio Coupling
17	.006	400	43-3500-7	484-006	DT6D6	ST-6-006	TC-26	" "
18	.006	400	43-3500-7	484-006	DT6D6	ST-6-006	TC-26	" "
19	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	Tone Compensation
20	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	" "
21	.006	400	43-3500-7	484-006	DT6D6	ST-6-006	TC-26	Audio Coupling
22	.02	400	61-0108	484-02	DT4S2	ST-4-02	TC-12	Diode Load Cap.
23	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	RF Bypass Pwr. Supply
24	.2	200	43-3500-3	484-.2	DT4P2	ST-4-2	TC-2	Bias Filter
25	.05	400	61-0170	484-05	DT4S5	ST-4-01	TC-15	2nd IF Plate Decoup.
26	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	2nd IF Screen Bypass
27	.05	400	61-0170	484-05	DT4S5	ST-4-05	TC-15	2nd IF Cathode Bypass
28	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	1st IF Plate Decoup.
29	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	1st IF Screen Bypass
30	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	AVC Filter
31	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	" "
32	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	Conv. Plate Decoup.
33	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	Osc. Plate Decoup.
34	100	500	60-10105237	1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass
35	100	500	60-10105237	1468-0001	5W5T1	MO.5-31	1FM-31	Tone Comp.
36	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter-Cer.
37	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	RF Bypass-Cer.
38	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	De-emphasis-Cer.
39	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	" "
40	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	Diode Filter - "
41	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	" " - "
42	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	IF Coupling "
43	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	Fil. Bypass - "
44	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	2nd IF Grid Filter-Cer.
45	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	1st IF Plate Decoup. "
46	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	Fil. Bypass-Cer.
47	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	RF Bypass- "
48	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Cap.-Cer.
49	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	Fil. Bypass-Cer.
50	250		60-10255237	1468-00025	5W5T25	MO.5-325	1FM-325	Osc. Feedback-Cer.
51	250		60-10255237					Fixed Padder-Silver
52	6	300	30-1224-9					Neutralizing Cap.-Cer.
53	220	300	30-1220-4					Osc. Feedback-Cer.
54	1000	300	30-1225	1468-001	1W5D1	MO.3-21	1FM-21	" " "
55	1500	300	60-20155404	1467-0015	1W5D15	MW.5-215	1FM-215	RF Bypass Pwr. Supply-Cer.
56	1500	300	60-20155404	1467-0015	1W5D15	MW.5-215	1FM-215	RF Screen Bypass-Cer.
57	1500	300	60-20155404	1467-0015	1W5D15	MW.5-215	1FM-215	RF Plate Decoup.-Cer.
58	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	RF Cathode Bypass-Cer.
59	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	Fil. Bypass-Cer.

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: PHILCO PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
113	117V AC @ .78A	640V CT @ .112A	2.5V AC @ 2.0A	6.3V AC @ 2.2A SEC. 4 6.3V CT @ .45A	32-9249	P-4080*	T22R32	P-2158*

*Drill new mounting holes.

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: PHILCO PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
114	2200Ω CT	3.7Ω	560Ω CT	.5Ω	32-8274	A-3824	T22S56	A-2036†	†Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS	REPLACEMENT DATA: PHILCO PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD RES. / VC IMP.				
115	650Ω / 3.7Ω	36-1611-3		12E30#	#Replace output transformer to match 6-8Ω voice coil.
	CONE DIA. / VC DIA.				
116	11½" / 3/4"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: PHILCO PART No.	MEISSNER PART No.	
117	Loop Ant.		0Ω	76-1989-3		
118	FM Dipole Antenna					
119	BC Ant.Coil		1.5Ω	32-4033-1		
120	SW " "		.2Ω	32-4050-3		
121	FM " "		0Ω	32-4158		
122	FM RF Coil		0Ω	32-4159		
123	BC Osc.Coil		3.5Ω	32-4019-4	14-1060	
124	PB " "		3Ω	32-4059-2		
125	" " "		3Ω	32-4059-2		
126	" " "		3Ω	32-4059-2		
127	" " "		1.8Ω	32-3779		
128	" " "		1.8Ω	32-3779		
129	SW " "		.1Ω	32-4113		
130	FM " "		0Ω	32-4018-2		
131A	AM 1st IF	1.2Ω	1.2Ω	32-4146		
B	FM " "	1.2Ω	20Ω			
132A	AM 2nd IF	11Ω‡	11Ω§	32-4156		‡Includes both primaries.
B	FM " "		1Ω			§Includes both secondaries.
133A	AM 3rd IF	11Ω‡	10Ω	32-4147		
B	FM Disc.		1Ω			
134	Par. Sup. Choke		0Ω	32-4157		
135	FM RF Plate Choke		.4Ω	32-4061-2		
136	FM Choke		.4Ω	32-4061-2		
137	" "		.1Ω	32-4111		

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: PHILCO PART No.		INSTALLATION NOTES
138-139	Bayonet	6-8	0.25	Blue	34-2064		Type 44
140	"	7.5	0.2	White	34-2039		Type 51

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
60	33	300	30-1223-8		5W5Q3	MO.5-43	MS-43	RF Coupling-Cer.
61	250	300	60-10255237	1468-00025	5W5T25	MO.5-325	1FM-325	" " "
62	250	500	60-10255237					Fixed Padder-Silver
63	750	300	60-10755301					Osc. Coupling
64	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	Fil. Bypass-Cer.
65	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	" " "
66	6	300	30-1224-9					Balancing Cap.-Cer.
145	.006	400	43-3500-7	484-006	DT6D6	ST-6-006	TC-26	Audio Coupling
146	100	300	30-1225-2	1468-0001	5W5T1	MO.5-31	1FM-31	2nd IF Cathode Bypass-Cer.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	PHILCO PART No.	IRC PART No.	CLAROSTAT PART No.	
67A	2 Meg.	½	33-5535-1	D1b-139X		Volume Control tapped @ 1 Meg.
B	Shaft		Not Req.	A		Attach to 67A per instructions
68	4 Meg.	½	33-5538-1			Tone Control & Sw.

RESISTORS

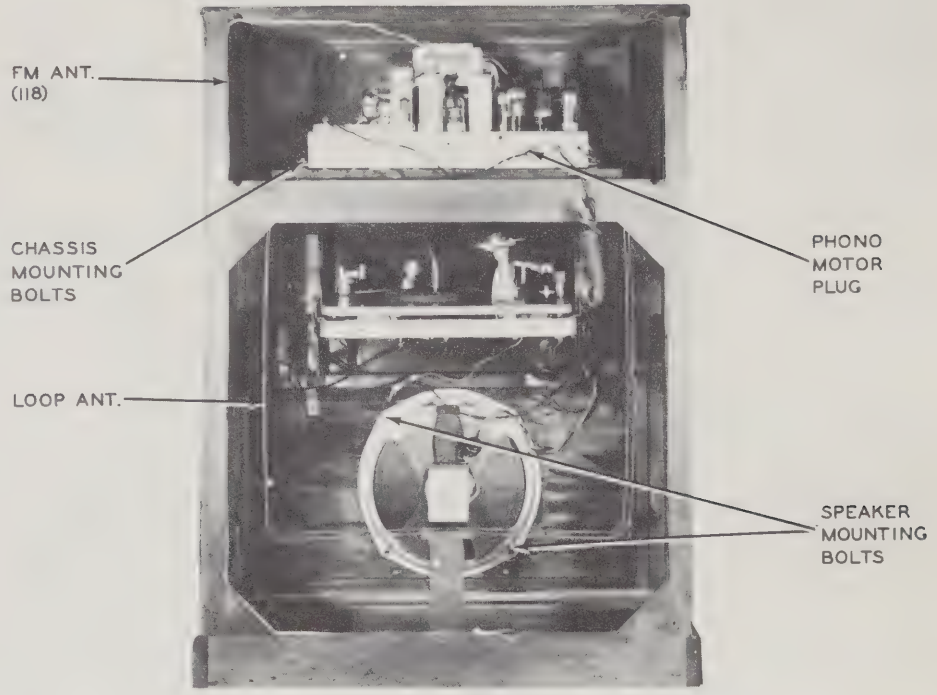
ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	PHILCO PART No.	IRC PART No.	
69	10Ω	½	66-0103340		Br.-Blk.-Blk. Parasitic Suppressor
70	150Ω	½	66-1153340		Br.-Grn.-Br. RF Cathode
71	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi.-Or. RF Screen Dropping
72	1000Ω	½	66-2103340	BTS-1000	Br.-Blk.-Red RF Plate Decoupling
73	6800Ω	½	66-2683340	BTS-6800	Blue-Gray-Red Osc. Cathode
74	2.2 Meg.	½	66-5223340	BTS-2.2 Meg.	Red-Red-Grn. Converter Grid
75	470KΩ	½	66-4473340	BTS-470K	Yl.-Vi.-Yl. " "
76	1500Ω	½	66-2153340	BTS-1500	Br.-Grn.-Red Converter Cathode
77	15KΩ	½	66-3153340	BTS-15K	Br.-Grn.-Or. Oscillator Grid
78	4700Ω	½	66-2473340	BTS-4700	Yl.-Vi.-Red Oscillator Plate Load
79	27KΩ	½	66-3273340	BTS-27K	Red-Vi.-Or. Oscillator Plate Load
80	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi.-Or. Converter Plate Decoupling
81	2.2 Meg.	½	66-5223340	BTS-2.2 Meg.	Red-Red-Grn. AVC Network
82	3.3 Meg.	½	66-5333340	BTS-3.3 Meg.	Or.-Or.-Grn. " "
83	68Ω	½	66-0683340		Blue-Gray-Blk. 1st IF Cathode
84	27KΩ	½	66-3273340	BTS-27K	Red-Vi.-Or. 1st IF Screen Dropping
85	1000Ω	½	66-2103340	BTS-1000	Br.-Blk.-Red 1st IF Plate Decoupling
86	2.2 Meg.	½	66-5223340	BTS-2.2 Meg.	Red-Red-Grn. 2nd IF Grid
87	150Ω	½	66-1153340		Br.-Grn.-Br. 2nd IF Cathode
88	68KΩ	½	66-3683340	BTS-68K	Blue-Gray-Or. 2nd IF Screen Dropping
89	1000Ω	½	66-2103340	BTS-1000	Br.-Blk.-Red 2nd IF Plate Decoupling
90	1 Meg.	½	66-5103340	BTS-1 Meg.	Br.-Blk.-Grn. Diode Load
91	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi.-Or. Diode RF Filter
92	330KΩ	½	66-4333340	BTS-330K	Or.-Or.-Yl. Diode Load
93	100KΩ	½	66-4103340	BTS-100K	Br.-Blk.-Yl. Tone Compensation
94	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi.-Or. Ratio Detector Diode Load
95	6.8 Meg.	½	66-5683340	BTS-6.8 Meg.	Blue-Gray-Grn. FM AF Load
96	100KΩ	½	66-4103340	BTS-100K	Br.-Blk.-Yl. De-emphasis
97	100KΩ	½	66-4103340	BTS-100K	Br.-Blk.-Yl. Series Test Jack
98	10 Meg.	½	66-6103340	BTS-10 Meg.	Br.-Blk.-Blue AF Grid
99	220KΩ	½	66-4223340	BTS-220K	Red-Red-Yl. AF Plate Load
100	1 Meg.	½	66-5103340	BTS-1 Meg.	Br.-Blk.-Grn. Phase Inverter Grid
101	4700Ω	½	66-2473340	BTS-4700	Yl.-Vi.-Red Phase Inverter Cathode
102	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi.-Or. Phase Inverter Cathode
103	56KΩ	½	66-3563340	BTS-56K	Grn.-Blue-Or. Phase Inverter Plate Load
104	330KΩ	½	66-4333340	BTS-330K	Or.-Or.-Yl. Output Grid
105	330KΩ	½	66-4333340	BTS-330K	Or.-Or.-Yl. " "
106	150KΩ	½	66-4153340	BTS-150K	Br.-Grn.-Yl. Bias Filter
107	1 Meg.	½	66-5103340	BTS-1 Meg.	Br.-Blk.-Grn. Phono Shunt
108	33KΩ	½	66-3333340	BTS-33K	Or.-Or.-Or. Tone Compensation
109	68Ω	½	66-0683340	BW-½-68	Blue-Gray-Blk. Feedback
110	4.7Ω	½	66-0474340	BW-½-4.7	Grn.-Br.-Gold "
111	15KΩ	2	66-3153340	BT-2-15K	Br.-Grn.-Or. Filter
112	135Ω	5	33-3435-2	ABu-135	Bias Network-See Note

Note-On IRC replacement set slider at 135Ω from one end.

PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

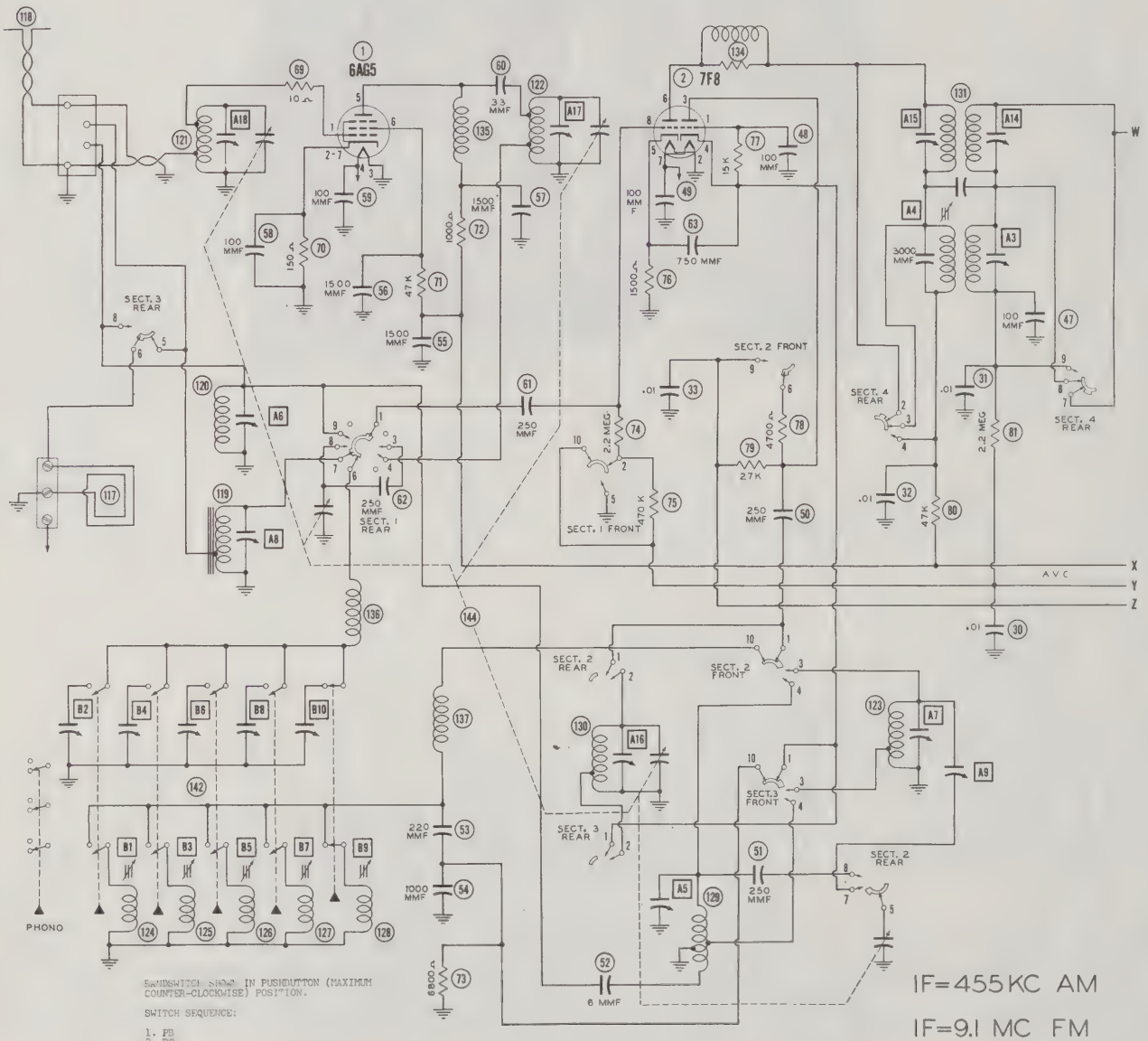
ITEM No.	PART NAME	PHILCO PART No.	NOTES
141	Switch	42-1801	Band
142	"	42-1756	Pushbutton Assby.
143	"	42-1702	Bin Light
144	Tuning Gang	31-2703-2	(18-514MMF) each section
A5	Trimmer Strip	31-6464	BC Osc. Pad.
A7			BC Osc. Adj.
A9			SW " "
A6	Trimmer Strip	31-6476	SW Ant. Adj.
A8			BC " "
	Dial Pointer	56-3179	



DISASSEMBLY INSTRUCTIONS

1. Remove four push-on type control knobs.
2. Remove loop antenna leads from terminal strip on chassis.
3. Remove FM antenna plug from chassis.
4. Remove phono-motor plug from chassis.
5. Disconnect phono-pickup plug.
6. Remove phono-compartment light from bracket.
7. Remove two Phillips head wood screws holding phono-compartment light switch in cabinet.
8. Remove speaker plug from speaker.
9. Remove four hex head bolts holding chassis in cabinet.
10. Remove two Phillips wood screws holding pushbutton assembly to front of cabinet. Remove chassis from cabinet.
11. Remove four hex nuts holding speaker in cabinet. Remove speaker from cabinet.

DATA 8/4-5-#-#-#-#-12
SET #39-FOLDER #15



SWITCH SHOWN IN PUSHBUTTON (MAXIMUM COUNTER-CLOCKWISE) POSITION.

SWITCH SEQUENCE:

1. PB
2. BC
3. SW
4. SW

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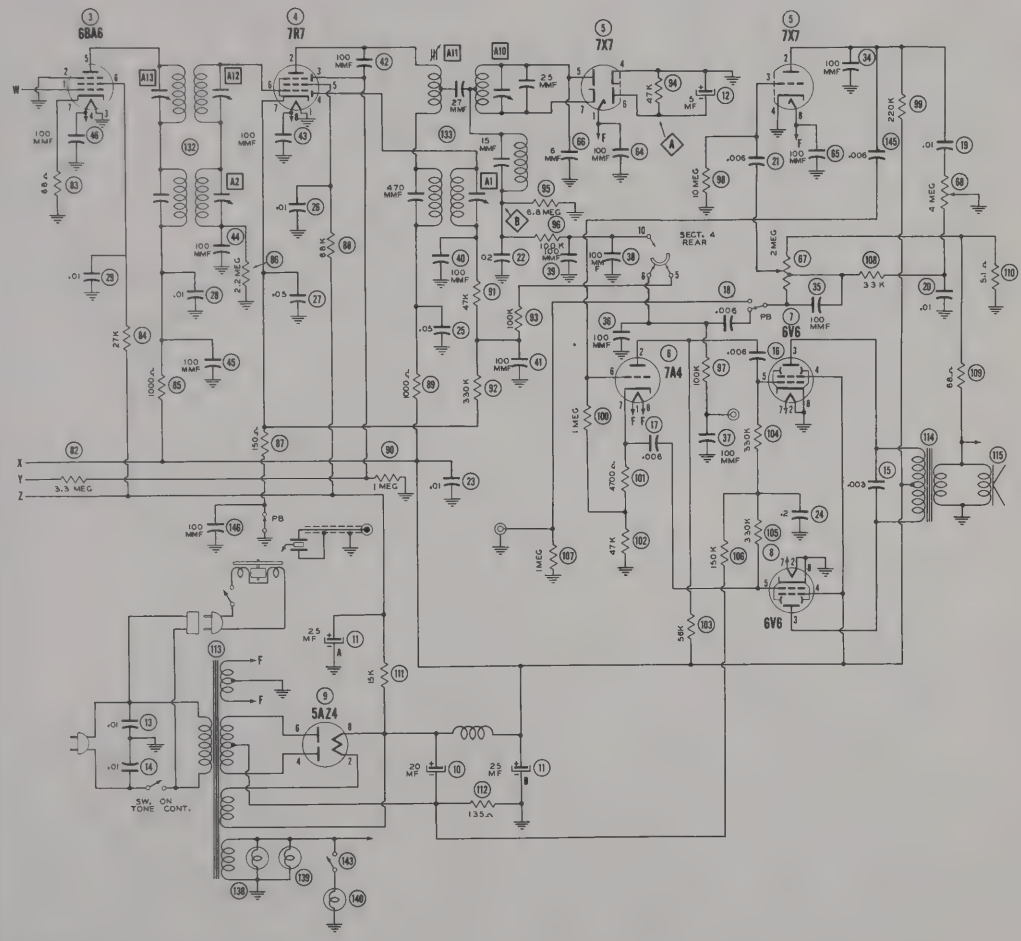

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489-15

VOLTAGE AND RESISTANCE WITH BAND SWITCH IN PUSHBUTTON POSITION.

VOLTAGE READINGS

	Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
‡	1	6AG5	0V.	1.7VDC	0V.	6.5VAC	64VDC	42VDC	1.7VDC	-
	2A	7F8	-4VDC§	0V.	100VDC	20VDC	3.5VDC	160VDC	6.5VAC	0V.
**	2B	7F8	-9VDC§	0V.	100VDC	0V.	3.5VDC	150VDC	6.5VAC	0V.
	3	6BA6	0V.	0V.	0V.	6.5VAC	250VDC	100VDC	1.2VDC	-
	4	7R7	0V.	260VDC	0V.	.3VDC	100VDC	0V.	1VDC	6.3VAC
‡	5	7X7	3.3VAC	132VDC	-.5VDC	0V.	-.4VDC	-.7VDC	-.8VDC	3.3VAC
	6	7A4	3.3VAC	190VDC	0V.	62VDC	0V.	2.7VDC	67VDC	3.3VAC
	7	6V6GT	0V.	6.5VAC	258VDC	260VDC	-10VDC	258VDC	0V.	0V.
	8	6V6GT	0V.	6.5VAC	258VDC	260VDC	-10VDC	0V.	0V.	0V.
	9	5AZ4	0V.	345VDC	0V.	320VAC	0V.	320VAC	0V.	345VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

	Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
‡	1	6AG5	10.5Ω	150Ω	0Ω	.1Ω	100KΩ	150KΩ	150Ω	-
	2A	7F8	22KΩ	0Ω	130KΩ	6.8KΩ	1.5KΩ	150KΩ	.1Ω	6.5 Meg.
**	2B	7F8	15KΩ	0Ω	130KΩ	.5Ω	1.5KΩ	150KΩ	.1Ω	6.5 Meg.
	3	6BA6	6.5 Meg.	0Ω	0Ω	.1Ω	100KΩ	130KΩ	68Ω	-
	4	7R7	0Ω	100KΩ	1 Meg.	347KΩ	17CKΩ	2.2 Meg.	150Ω	.1Ω
‡	5	7X7	.05Ω	320KΩ	10 Meg.	0Ω	6.8 Meg.	47KΩ	6.8 Meg.	.[illegible]
	6	7A4	.05Ω	160KΩ	INF.	47KΩ	1 Meg.	1 Meg.	52KΩ	.[illegible]
	7	6V6GT	INF.	.1Ω	100KΩ	100KΩ	430KΩ	100KΩ	0Ω	0Ω
	8	6V6GT	INF.	.1Ω	100KΩ	100KΩ	430KΩ	INF.	0Ω	0Ω
	9	5AZ4	INF.	100KΩ	INF.	220Ω	INF.	215Ω	INF.	100KΩ

**TAKEN IN MANUAL TUNING POSITION.

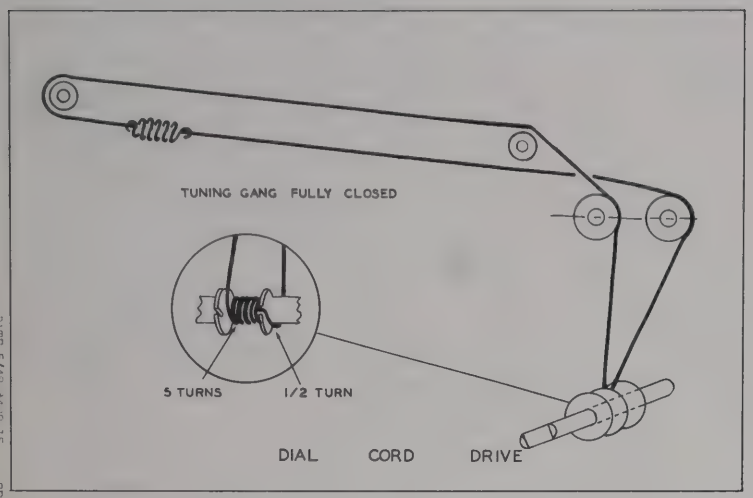
‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.
RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

STAGE GAIN MEASUREMENTS

ANTENNA TO CONVERTER GRID	10X		600KC
CONVERTER GAIN	12X	IN	600KC
		OUT	455KC
1st IF TRANSFORMER	3.3X		455KC
1st IF TUBE	7X		455KC
2nd IF TRANSFORMER	2X		455KC
2nd IF TUBE	250X		455KC
3rd IF TRANSFORMER	1.5X		455KC
1st AUDIO	45X		400 ~
PHASE INVERTER	.9X		400 ~
OUTPUT	18X		400 ~

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by connecting negative (-) volts to the AVC line.



DATE 6/49-4449-15 SET #39-FOLDER #1

PUSHBUTTON ADJUSTMENTS

Range of pushbuttons reading from left to right are: 540KC-1000KC, 600-1200KC, 650-1300KC, 850-1500KC and 900-1600KC.

Make a list of stations to be set up ranging from low to high freq. stations making certain each station falls within range of its button.

1. Turn receiver on and allow it to warm up for at least 15 minutes.
2. Turn bandswitch fully counter-clockwise.
3. Push in 2nd button from left, next to phono button, and adjust B1 to tune in station.
4. Adjust B2 for maximum volume.
5. To set up the remaining buttons follow same procedure outlined above adjusting B3, B5, B7 and B9 to tune in stations and B4, B6, B8 and B10 for maximum volume.
6. Check for correct station setting by alternately switching from manual to pushbutton and note change in volume of fidelity.

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

When complete AM & FM alignments are to be made, AM Alignment must be done first. If FM Alignment is not required AM alone may be made.

Turn tuning cap. fully closed and mark setting of pointer. This is the index mark referred to in Steps below.

Use insulated alignment screwdriver for all adjustments.

AM ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to terminal #1 of ant. terminal strip. Low side to chassis.	455KC	BC (1 position clockwise)	Tuning cap. fully closed	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output in order given. Do not repeat adjustments.
2		Loop	15MC	SW (2 positions clockwise)	7-1/18" from index mark.	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. Tune sig. gen. to 15.9MC. If signal is not heard retune sig. gen. to 15MC and open A5 to next peak. Adjust for maximum output and recheck for image.
3		"	"	"	Tune for maximum output.	"	A6	Rock tuning cap. and adjust for maximum output.
4		"	1700KC	BC	6-15/32" from index mark.	"	A7	Preset A9 by tightening firmly and loosening 1/4 turn. Adjust A7 for maximum output.
5		"	1500KC	"	Tune for maximum output.	"	A8	Adjust for maximum output.
6		"	580KC	"	"	"	A9	Rock tuning cap. and adjust for maximum output. Repeat Steps 4, 5 & 6 until no further improvement can be made, making Step 6 last adjustment.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR, VTVM & OUTPUT METER

If a VTVM is not available a 20KΩ per volt DC voltmeter may be used as an output indicator.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
7	.1 MFD.	High side to Pin 1 (grid) 6BA6 1st IF Tube (3). Low side to chassis.	9.1MC (400∿ Amp. modulation)	FM (fully clockwise)	Tuning cap. fully closed	DC probe to Point ◬. Common to chassis.	A10,All A12,A13	Attenuate sig. gen. to give approx. 9 volt reading on 10 volt scale. Adjust A10, All, A12 & A13 for maximum negative deflection.
8	.1 MFD.	High side to Pin 8 (grid) 7F8. Low side to chassis.	"	"	"	"	A14, A15	Adjust for maximum deflection. Do not repeak these adjustments after this step.
						OUTPUT METER		
9	.1 MFD.	"	"	"	"	Across voice coil	A10	Adjust for minimum audio output. This adjustment is critical. Turn A10 very slowly. Continue with FM RF Alignment, Step 10.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal 60∿ modulation with 450KC sweep, use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
7	.1 MFD.	High side to Pin 1 (grid) 6BA6 1st IF Tube (3). Low side to chassis.	9.1MC (freq. modulated)	FM	Tuning cap. fully closed	Vertical input to Point ◬. Ground to chassis.	A11,A12 A13	Disconnect 2 MFD cap. from point ◬. Adjust A11, A12, and A13 for maximum amplitude, symmetry and coincidence of pattern per Fig. 1.
8	.1 MFD.	High side to Pin 8 (grid) 7F8. Low side to chassis.	"	"	"	"	A14, A15	Adjust for maximum amplitude, symmetry & coincidence of pattern per Fig. 1.
9	.1 MFD.	"	"	"	"	Vertical input to Point ◭. Ground to chassis.	A10	Reconnect 2 MFD. cap. to Point ◬. Adjust A10 for maximum straightness of crossover lines with crossover occurring at center of pattern per Fig. 2. Continue with FM RF Alignment, Step 10.

FM RF ALIGNMENT

To check resonance of the FM coils in Steps 12, 13 & 14 use a tuning wand with a powdered iron slug at one end and a brass slug at the other. If inserting the iron slug in the coil increases the output compress the turns slightly. If the brass increases the output spread the turns slightly. When the output decreases with insertion of either end of the wand the coil is adjusted correctly.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
10	Direct	High side to Pin of FM Ant. Socket. Low side to chassis.	105MC	FM	5-3/16" from index mark.	DC probe to Point ◭. Common to chassis	A16	Adjust for maximum deflection.
11	Direct	"	"	"	Tune for maximum deflection.	"	A17,A18	Rock tuning cap. and adjust for maximum deflection.
12	Direct	"	92MC	"	1-3/4" from index mark.	"	FM Osc Coil (130)	Adjust for maximum deflection per prealignment instructions.
13	Direct	"	"	"	Tune for maximum deflection.	"	FM RF Coil (122)	"
14	Direct	"	"	"	"	"	FM Ant. Coil (121)	Adjust for maximum deflection per prealignment instructions. Repeat Steps 10 through 14 until no further improvement can be made.

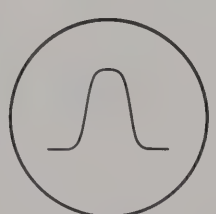
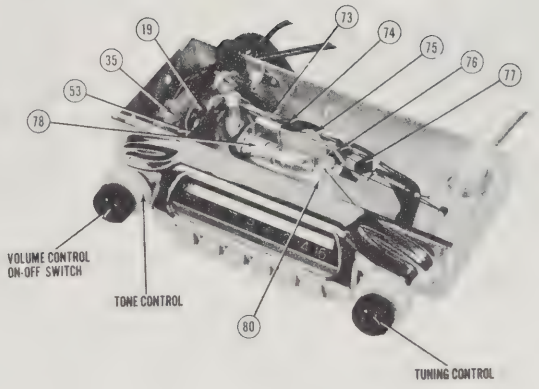


FIG. 1

FIG. 2



PHILCO
MODEL CR-12

PHILCO
MODEL CR-12

PHILCO MODEL CR-12

TRADE NAME	Philco, Model CR-12
MANUFACTURER	Philco Corp., Tioga & "C" Sts., Philadelphia, Pa.
TYPE SET	Battery Operated Universal Automotive Superheterodyne Receiver
TUBES (EIGHT)	Types, 6BA6 RF Amp., 6BE6 Converter, 6BA6 IF Amp., 6AV6 Det.-AVC-AF, 6C4 Phase Inv., (2) 7C5 Power Output, 6X4 Rectifier.
POWER SUPPLY	6 Volt Storage Battery
TUNING RANGE—BROADCAST	535-1600KC RATING 8.3 Amp. @ 6.3 Volts DC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

With dial cable disengaged turn tuning slugs fully in turn dial cable till pointer is at extreme low freq. end of dial and re-engage cable.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.05 MFD	High side to ant. receptacle. Low side to chassis.	455KC	Tuning slugs fully out.	Across voice coil	A1,A2, A3,A4	Adjust for maximum output in order given.
2	.05 MFD	"	"	Depress any pushbutton other than manual.	"	A5	Adjust for minimum output.
3	2 30MMFD cap.	High side in series with one 30MMFD cap. to ant. receptacle. Connect the other 30MMFD from ant. receptacle to chassis. Low side of sig. gen. to chassis.	550KC	580KC (Depress dial button)	"	A6	Rock tuning control and adjust for maximum output.
4	"	"	1600KC	Tune for maximum output.	"	A7,A8	Adjust for maximum output.
5	"	"	1400KC	"			Reengage drive cable for correct calibration. Adjust for maximum output. Repeat Steps 3, 4 and 5 until no further improvement can be made.

After receiver has been installed in car adjust A8 for maximum volume on weak station about 1400KC.

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		PHILCO PART No.	STANDARD REPLACEMENT		
1	RF Amp.	6BA6	6BA6	7BK	
2	Converter	6BE6	6BE6	7CH	
3	IF Amp.	6BA6	6BA6	7BK	
4	Det.-AVC-AF	6AV6	6AV6		
5	Phase Inv.	6C4	6C4	6BG	
6	Power Output	7C5	7C5	6AA	
7	" "	7C5	7C5	6AA	
8	Rectifier	6X4	6X4	15BS	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
9A	20	350	61-0150		UP22245C	DY-404	EL-415	◓ Filter
B	10	350						■ "
C	5	300						▲ "
D	10	25						Cathode Bypass
10	.0033	1000	61-0115	1084-003	MD16D3	TM-16-003	TR-23	Buffer
11	.5	100	61-0137			SHH-2		Hash Filter
12	.5	120	61-0137			SHH-2		" "
13	.006	1000	61-0105	1084-006	MD16D6	TM-16-006	TR-26	Output Plate Bypass
14	.01	600	61-0120	684-01	DT6S1	ST-6-01	TC-11	Audio Coupling
15	.01	600	61-0120	684-01	DT6S1	ST-6-01	TC-11	" "
16	.0015	200		484-002	DT6D2	ST-6-002	TC-22	" "
17	.004	600	61-0179	684-004	DT6D4	ST-6-004	TC-24	" "
18	.01	600	61-0120	684-01	DT6S1	ST-6-01	TC-11	Tone Compensation
19	.01	200	61-0120	684-01	DT4S1	ST-4-01	TC-11	" "
20	.05	400	61-0122	484-05	DT4S5	ST-4-05	TC-15	Screen Bypass
21	.05	200	61-0122	484-05	DT4S5	ST-4-05	TC-15	IF Cathode Bypass
22	.5	120	61-0137			SHH-2		Contact Bypass
23	.05	200	61-0122	484-05	DT4S5	ST-4-05	TC-15	AVC Filter
24	.05	200	61-0122	484-05	DT4S5	ST-4-05	TC-15	RF Cathode Bypass
25	330	500	62-133001001	1468-00035	5W5T3	MO.5-33	1FM-335	Hash Filter-Cer.
26	330	500	62-133001001	1468-00035	5W5T3	MO.5-33	1FM-335	" " "
27	100	500	30-1224-18	1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass-Cer.
28	100	500	30-1224-18	1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter-Cer.
29	100	500	30-1224-18	1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Cap.
30	380	500	30-1220-37					Fixed Trimmer
31	54.5	500	61-0149					" " -Cer.
32	180	500	60-10205307					Fixed Pad
33	180	500	60-10205307	1468-0002	5W5T2	MO.5-32	1FM-32	RF Coupling
34	50	500		1469-00005	5R5Q5	MOS.5-45	MS-45	Fixed Trimmer-Cer.

CONTROLS

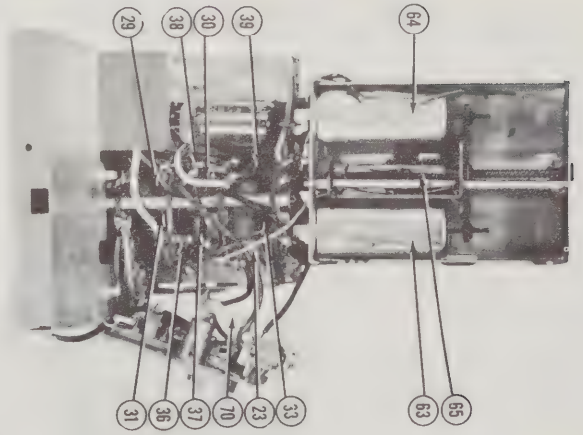
ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	PHILCO PART No.	IRC PART No.	CLAROSTAT PART No.	
35	350KΩ-5 Meg.	½	33-5557 or 33-5557-1*			Volume-Tone Controls & Sw.-See Note

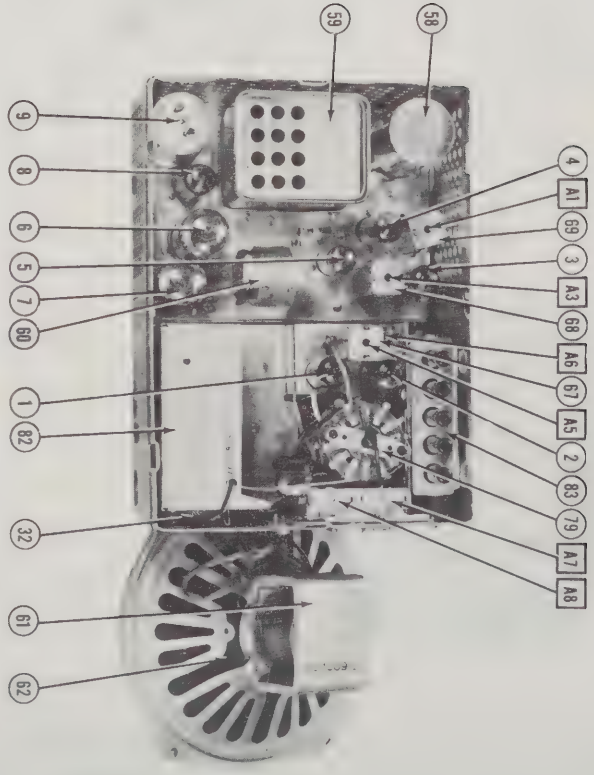
Note-Dual unit operated by concentric shaft. *Used in Buick only.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	PHILCO PART No.	IRC PART No.	
36	220Ω	½	66-1223340	BW-½-220	Red-Red-Br. RF Cathode
37	220Ω	½	66-1223340	BW-½-220	Red-Red-Br. " "
38	10KΩ	½	66-3103340	BTS-10K	Br.-Blk.-Or. RF Plate Load
39	1 Meg.	½	66-5103340	BTS-1 Meg.	Br.-Blk.-Grn. Conv. Grid
40	1 Meg.	½	66-5103340	BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
41	22KΩ	½	66-3223340	BTS-22K	Red-Red-Or. Oscillator Grid
42	2200Ω	½	66-2223340	BTS-2200	Red-Red-Red IF Cathode
43	27KΩ	1	66-3274340	BTA-27K	Red-V1.-Or. Screen Dropping
44	27KΩ	½	66-3273340	BTS-27K	Red-V1.-Or. Diode RF Filter
45	10 Meg.	½	66-6103340	BTS-10 Meg.	Br.-Blk.-Blue AF Grid
46	220KΩ	½	66-4223340	BTS-220K	Red-Red-Y1. AF Plate Load
47	10 Meg.	½	66-6103340	BTS-10 Meg.	Br.-Blk.-Blue Phase Inverter Grid
48	220KΩ	½	66-4223340	BTS-220K	Red-Red-Y1. Phase Inverter Plate Load
49	220KΩ	½	66-4223340	BTS-220K	Red-Red-Y1. Phase Inverter Cathode
50	470KΩ	½	66-4473340	BTS-470K	Y1.-V1.-Y1. Output Grid

CHASSIS—TOP VIEW





PARTS LIST AND DESCRIPTIONS (Continued)

51	470KΩ	½	66-4473340	BTS-470K	Y1.-V1.-Y1. Output Grid
52	330Ω	1	66-1334340	BW-1-330	Or.-Or.-Br. Output Cathode
53	15KΩ	½	66-3153340	BTS-15K	Br.-Grn.-Or. Tone Compensation
54	4700Ω	½	66-2473340	BTS-4700	Y1.-V1.-Red Filter
55	1000Ω	1	66-2104340	BTA-1000	Br.-Blk.-Red "
56	100Ω	1	66-1104340	BW-1-100	Br.-Blk.-Br. Hash Suppression
57	100Ω	1	66-1104340	BW-1-100	Br.-Blk.-Br. " "

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: RADIART PART No.	INSTALLATION NOTES
58A	Interrupter	6.3	115∿	83-0025	5326‡	
B				45-6307		Alternate vibrator

TRANSFORMER (VIBRATOR)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: PHILCO PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
59	6.3V DC @ 2.7A	330V CT @ .065A			32-8314			

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: PHILCO PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
60	10000Ω CT	3.8Ω	430Ω CT	.4Ω	32-8316	A-3856‡	T22886‡	A-2900‡	‡Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS	REPLACEMENT DATA: PHILCO PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD RES. / VC IMP.				
61	4.1Ω / 3.8Ω	36-1609-2	ST-112‡ Mod. P6-T	7EV6	‡Use adaptor baffle.
	CONE DIA. / VC DIA.				
62	6-3/4" / 3/4"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: MEISSNER PART No.
63	Ant. Coil, MAN.		10Ω	65-0443-4	
64	RF Coil, MAN		11Ω	65-0443-5	
65	Osc. " "		9Ω	65-0443-6	
66	Osc. Shunt Coil		12Ω	32-4110	
67	IF Trap		22.3Ω	32-4162	
68	Input IF	12Ω	12Ω	32-4160	16-6678
69	Output IF	15Ω	15.5Ω	32-4161	16-6678
70	Supp. Choke		7Ω	65-0437	
71	Hash Choke		.1Ω	32-4170	
72	" "		.1Ω	32-1374-2	
84	" "		.1Ω		

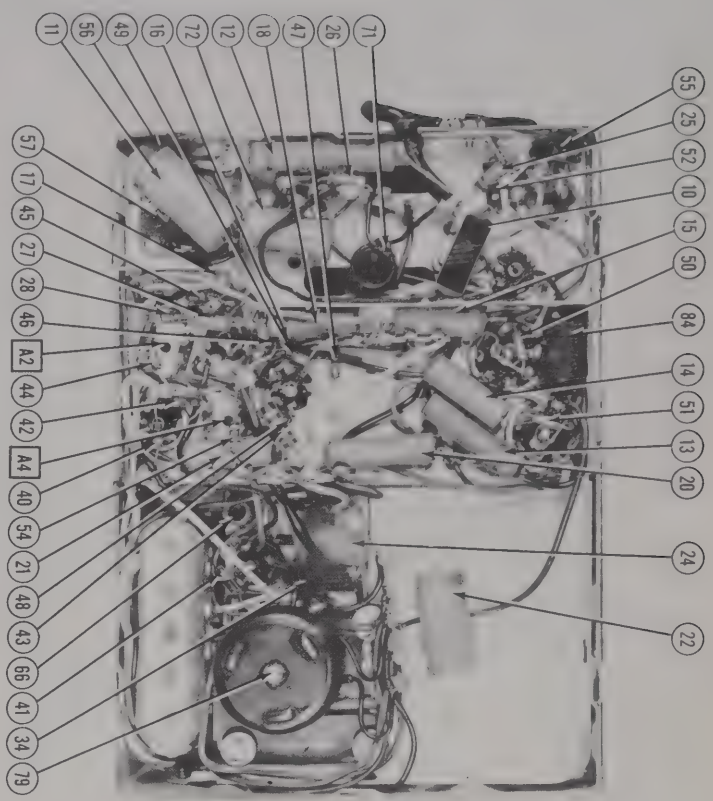
DIAL LIGHT

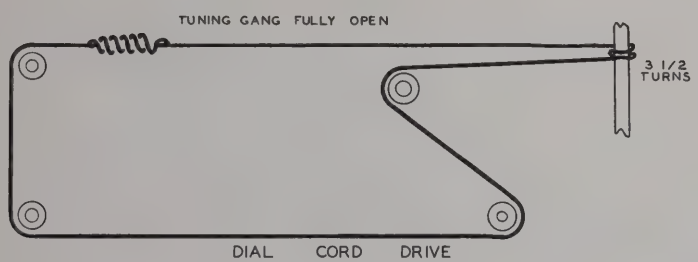
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA:	INSTALLATION NOTES
73-78	Bayonet	6-8	0.25	Blue	34-2040		Type 44

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
79	Switch Assby.	76-2945	Switch and Solenoid
80	"	76-2957	PB Switch-Mute Switch-Lamp Housing
81	Fuse		SFE14
82	Tuning Assby.	76-2919	Manual
83	" "	76-2715	Push-Button " "
	Knob	56-4406	

CHASSIS—BOTTOM VIEW





PUSHBUTTON ADJUSTMENTS

Ranges of pushbuttons are: #1 - 540-1000KC, #2 - 650-1200KC, #3 - 700-1300KC, #4 - 750-1400KC and #5 - 850-1600KC.

Make a list of stations ranging from low to high frequency stations making certain that each station falls within range of its button.

1. Turn receiver on and allow it to warm up for at least 15 minutes.
2. Depress first pushbutton on left.
3. Adjust knob B_1 for maximum volume on desired station.
4. Depress second button from left and adjust knob B_2 for maximum volume on desired station.
5. Continue as above adjusting numbered buttons with corresponding numbered knobs for maximum volume on desired station until all five buttons have been set up.

VOLTAGE READINGS

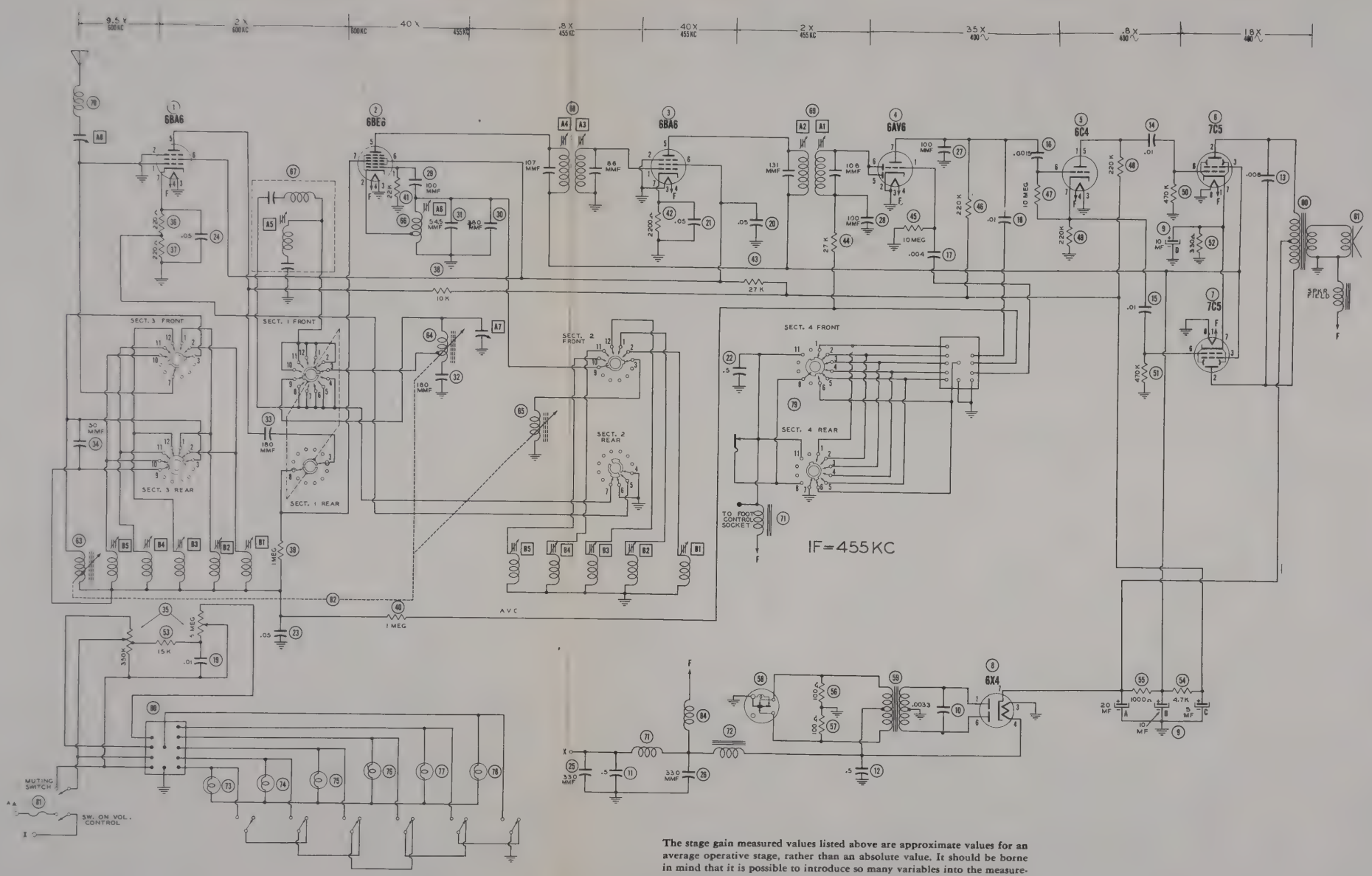
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6BA6	-.1VDC	0V.	0V.	6.3VDC	180VDC	60VDC	1.6VDC	-
2	6BE6	-1.6VDC§	0V.	0V.	6.3VDC	250VDC	60VDC	-.1VDC	-
3	6BA6	0V.	0V.	0V.	6.3VDC	250VDC	60VDC	3.7VDC	-
4	6AV6	-.5VDC	0V.	0V.	6.3VDC	-.4VDC	-.4VDC	100VDC	-
5	6C4	112VDC	0V.	0V.	6.3VDC	112VDC	.3VDC	90VDC	-
6	7C5	0V.	265VDC	250VDC	0V.	0V.	0V.	15VDC	6.3VDC
7	7C5	0V.	265VDC	250VDC	0V.	0V.	0V.	15VDC	6.3VDC
8	6X4	310VAC	0V.	0V.	6.3VDC	0V.	310VDC	270VDC	-

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6BA6	1.3 Meg.	0Ω	0Ω	.1Ω	165KΩ	180KΩ	440Ω	-
2	6BE6	22KΩ	.9Ω	0Ω	.1Ω	150KΩ	180KΩ	2.3 Meg.	-
3	6BA6	12Ω	0Ω	0Ω	.1Ω	150KΩ	150KΩ	2.2KΩ	-
4	6AV6	10 Meg.	0Ω	0Ω	.1Ω	350KΩ	350KΩ	370KΩ	-
5	6C4	370KΩ	0Ω	0Ω	.1Ω	370KΩ	10 Meg.	220KΩ	-
6	7C5	0Ω	150KΩ	150KΩ	0Ω	0Ω	470KΩ	340Ω	.1Ω
7	7C5	0Ω	150KΩ	150KΩ	0Ω	0Ω	470KΩ	340Ω	.1Ω
8	6X4	360Ω	INF.	0Ω	.1Ω	INF.	420Ω	150KΩ	-

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volts.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Battery voltage maintained at 6.3 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - Volume control at maximum, no signal applied for voltage measurements.



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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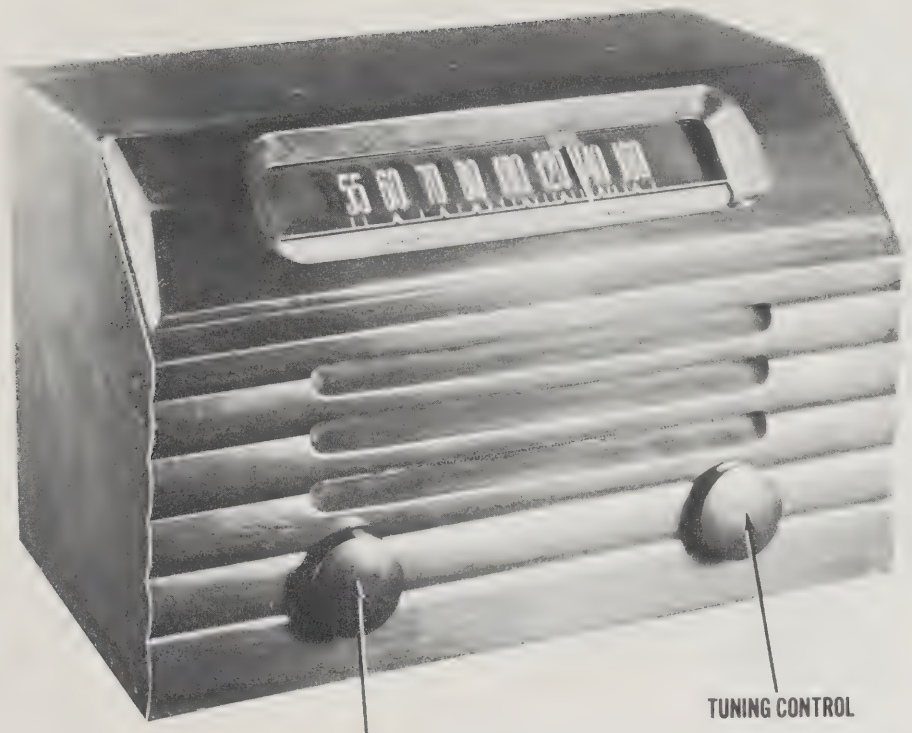
The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.



RCA MODEL 8X53

TRADE NAME	RCA (Victor), Model 8X53 (Ch. RC-1064)
MANUFACTURER	RCA Victor Div., Radio Corp. of America, Camden, N.J.
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 12SA7 Converter, 12SK7 IF Amp., 12SQ7 Det.-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	105-125 Volts AC-DC
TUNING RANGE—BROADCAST	540-1600KC RATING .27 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

There are four calibration marks on dial backplate. Reading from left to right they are: end limit, 600KC, 1000KC, 1300KC. With tuning cap. fully closed pointer should set at end limit mark.

Use isolation transformer if available. If not, connect a .1 MFD capacitor in series with low side of signal generator and B-.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 4 of 12SK7. Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD to reduce hum modulation.
2	.1 MFD.	High side to rear stator of tuning cap. Low side to B-.	"	"	"	A3,A4	"
3		Place sig. gen. leads near loop antenna.	1300KC	1300KC calibration mark on dial backplate.	"	A5,A6	Adjust for maximum output.
4	.1 MFD.	"	600KC	Tune for maximum output.	"	A7	Rock tuning cap. and adjust A7 for maximum output. Repeat Steps 3 & 4 until no further improvement can be made.

RCA (VICTOR) MODEL
8X53 (Ch. RC-1064

RCA (VICTOR) MODEL
8X53 (Ch. RC-1064

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		RCA PART No.	STANDARD REPLACEMENT		
1	Converter	12SA7	12SA7	7R	
2	IF Amp.	12SK7	12SK7	7N	
3	Det.-AVC-AF	12SQ7	12SQ7	7Q	
4	Power Output	50L6GT	50L6GT	7AC	
5	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	RCA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
6A	30	150	70408	PRSA150-50-50	EDL5315	DSB-5030-150	TA-530	Filter-Green
B	50	150						" -Red
7	.05	400	70610	484-05	DT4S5	ST-4-05	TC-15	Rectifier Bypass
8	.02	400	70611	484-02	DT4S2	ST-4-02	TC-12	Output Cathode Bypass
9	.005	400	70606	484-005	DT6D5	ST-6-005	TC-25	Audio Coupling
10	.02	400	70611	484-02	DT4S2	ST-4-02	TC-12	" "
11	.05	400	70615	484-05	DT4S5	ST-4-05	TC-15	AVC Filter
12	.1	400	70617	484-.1	DT4P1	ST-4-.1	TC-1	Line Isolation
13	330	500	72571	1468-00033	5WS[illegible]	MO.5-33	1FM-33	AF Plate Bypass
14	300	500	39632	1468-00031	5WS[illegible]	MO.5-315	1FM-315	RF Bypass
15	56	500	39622	1468-00005	5WS[illegible]	MO.5-45	1FM-45	Osc. Grid Cap.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	RCA PART No.	IRC PART No.	CLAROSTAT PART No.	
16A	500KΩ	½	70322	D13-133#	M-6[illegible]-2#	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 16A per instructions
C	Switch		" "	-1	SW-A	" " " " "

#Install a 47KΩ resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original. (Controls viewed from shaft side, terminals down.)

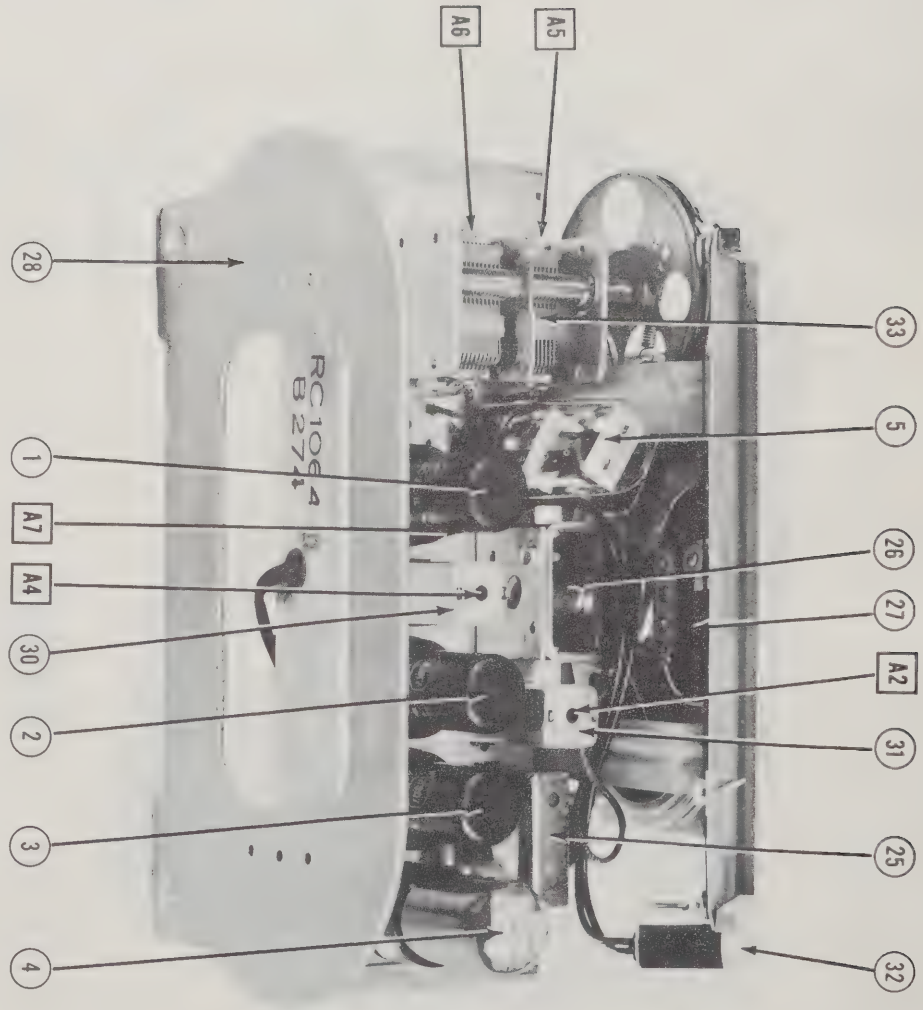
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	RCA PART No.	IRC PART No.	
17	2.2K	½		BTS-2.2K	Red-Red-Or. Osc. Grid
18	3.3 Meg.	½		BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
19	4.7 Meg.	½		BTS-4.7 Meg.	Yl.-Vi.-Grn. AF Grid
20	220KΩ	½		BTS-220K	Red-Red-Yl. AF Plate Load
21	470Ω	2		BTS-470K	Yl.-Vi.-Yl. Output Grid
22	150Ω	2		BW-2-150	Brn.-Red-Brn. Output Cathode
23	1200Ω	1		BTA-1200	Grn.-Red-Red Filter
24	220KΩ	½		BTS-220K	Red-Red-Yl. Line Isolation

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		RCA PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
25	17000Ω	3.5Ω	211Ω tapped @ 11Ω	.5Ω	72296	A-3876†		A-2928†	†Drill new mounting holes, add extra filter to reduce hum level.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA RCA PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.				
[illegible]	PM	[illegible]	70470		46A15*	*Dri[illegible]
	CONE DIA.	VC DIA.				
27	4"x6"	1/2"				

R F COILS

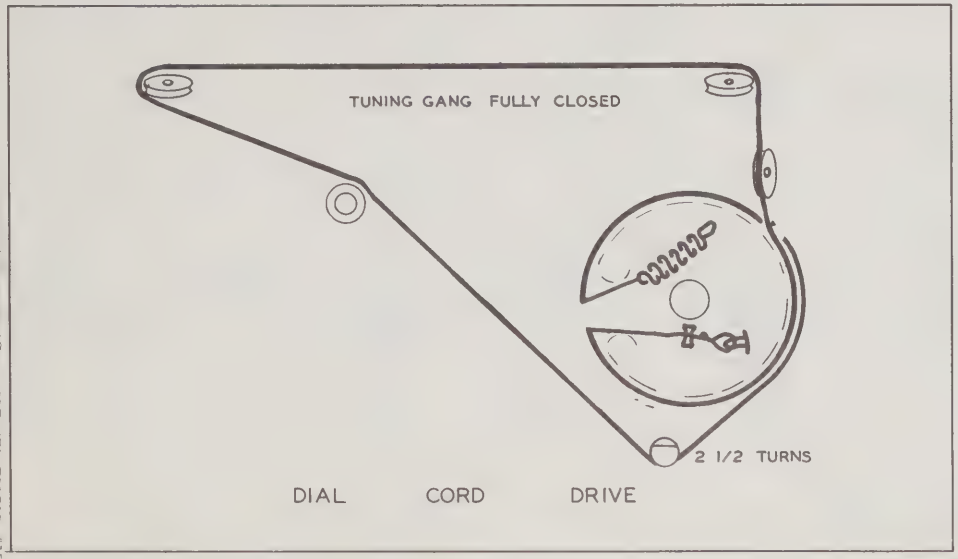
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA RCA PART No.	REPLACEMENT DATA MEISSNER PART No.
28	Loop Ant.		1.2Ω	73049	
29	Osc. Coil	1Ω	6Ω	73048	14-1060
30	Input IF	16Ω	12.5Ω	73036	16-6668
31	Output IF	15Ω	15Ω	73037	16-6669

DIAL LIGHT

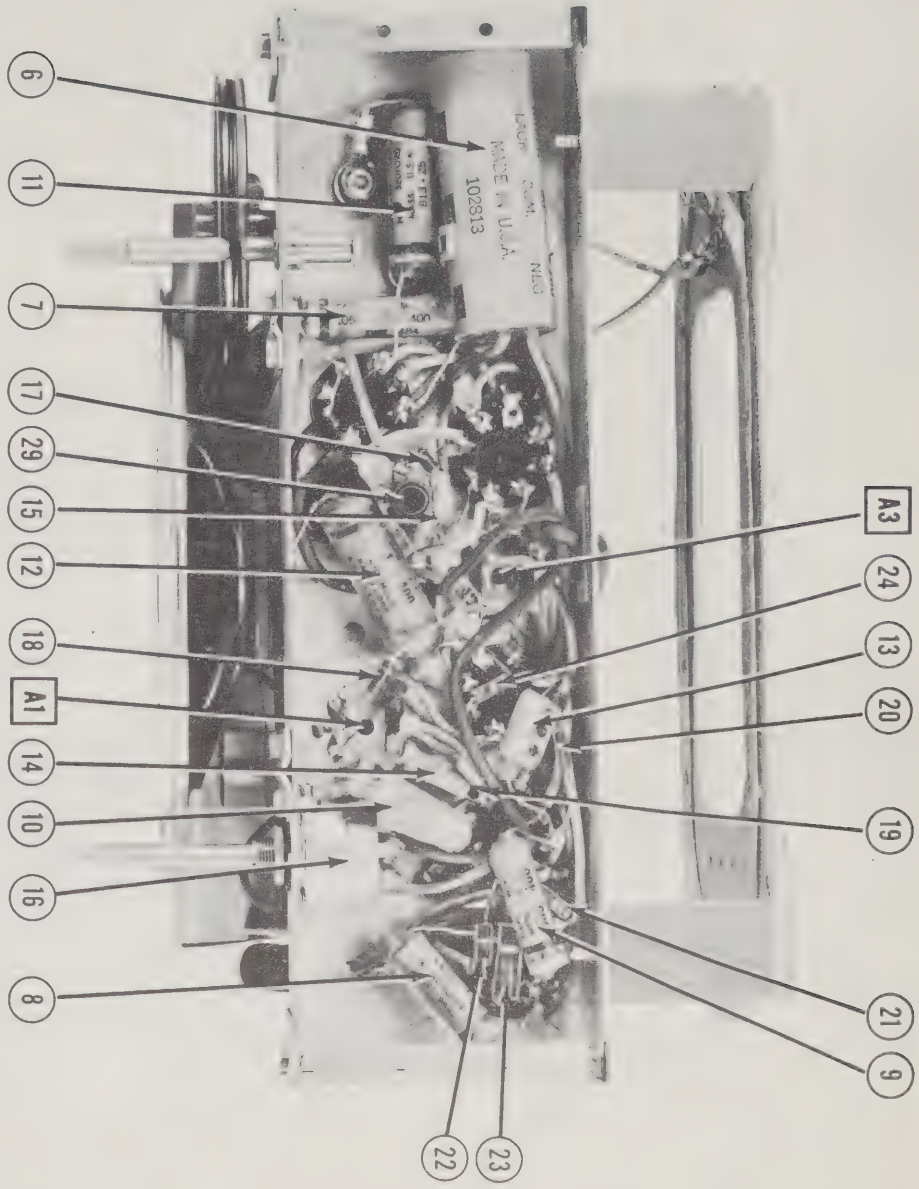
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA RCA PART No.		INSTALLATION NOTES
32	Bayonet	7.5	0.2	White	11765		Type 51

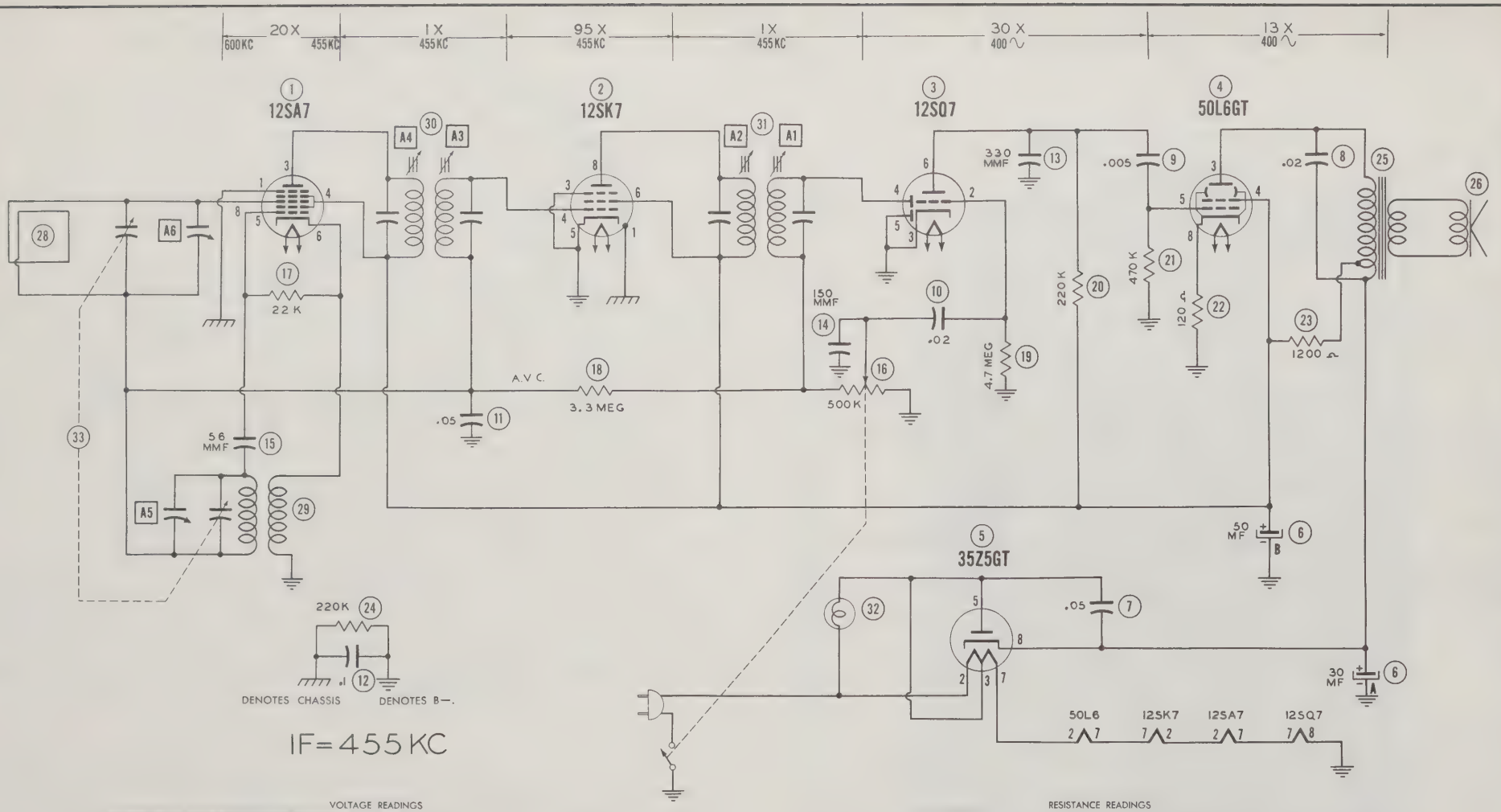
MISCELLANEOUS

ITEM No.	PART NAME	RCA PART No.	NOTES
33	2 Gang Var. Ca[illegible]	75047	(23-407 MMF, 25-1.2MMF)
	Dial	70476	Glass
	Dial Pointer	70469	
	Knob	11771	Maroon



CHASSIS—BOTTOM VIEW





IF = 455 KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	0V.	25VAC	90VDC	90VDC	-17VDC§	0V.	12.5VAC	-.5VDC
2	12SK7	0V.	25VAC	0V.	-.5VDC	0V.	90VDC	38VAC	90VDC
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	62VDC	12.5VAC	0V.
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	125VDC	38VAC	5.4VDC
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0V.	26VAC	125VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	220KΩ	26Ω	400KΩ	400KΩ	22KΩ	1Ω	13Ω	3.8 Meg.
2	12SK7	220KΩ	26Ω	0Ω	3.8 Meg.	0Ω	400KΩ	40Ω	400KΩ
3	12SQ7	220KΩ	4.7 Meg.	0Ω	500KΩ	0Ω	620KΩ	13Ω	0Ω
4	50L6GT	INF.	87Ω	400KΩ	400KΩ	470KΩ	400KΩ	40Ω	120Ω
5	35Z5GT	INF.	117Ω	112Ω	INF.	112Ω	0Ω	57Ω	400KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

489-17

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of + 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

RCA (VICTOR) MODEL 77V2

TRADE NAME	RCA (Victor), Model 77V2 (Ch. RC-606-C)
MANUFACTURER	RCA Victor Div., Radio Corp. of America, Camden, N.J.
TYPE SET	AC Operated Combination Phono-Radio 2 Band Superheterodyne Receiver with Loop Ant.
TUBES (SEVEN)	Types, 6SA7 Converter, 6SK7 IF Amp., 6SQ7 Det.-AVC-Phase Inv., 6SQ7 AF Amp., (2) 6V6GT Power Output, 6X5GT Rectifier.
POWER SUPPLY	105-125 Volts AC — RATING .46 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540-1600KC — SHORT WAVE 9.2-16MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to 2nd reference mark from left edge of dial backplate. This is the calibration mark referred to in the Steps below. Loop should be maintained in same relative position to chassis as when receiver in cabinet. Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.01 MFD	High side to Pin 4 (grid) of 6SK7. Low side to chassis.	455KC	BC (center position)	Tuning cap. fully closed	Across voice coil	A1,A2	Adjust for maximum output.
2	.01 MFD	High side to Pin 8 (grid) of 6SA7. Low side to chassis.	"	"	"	"	A3,A4	" " " "
3	200MMFD	High side to yellow lead of loop. Low side to chassis. (Link closed).	1400KC	"	5-1/16" from calibration mark.	"	A5	" " " "
4	200MMFD	"	600KC	"	Tune for maximum output.	"	A6	Rock tuning cap. and adjust for maximum output. Repeat Steps 3 and 4 until no further improvement can be made.
5	47MMFD	High side to ant. terminal. Low side to chassis.	15.2MC	SW (fully clockwise)	5-7/16" from calibration mark.	"	A7	Adjust for maximum output. Tune signal generator to 16.1 MC. If signal does not come in retune sig. gen. to 15.2MC and open A7 to next peak. Adjust for maximum output and recheck for image.
6	47MMFD.	High side to ant. terminal. Low side to chassis.	15.2MC	SW (fully clockwise)	Tune for maximum output.	Across voice coil	A8	Adjust for maximum output.
7	47MMFD.	"	9.5MC	"	9.5MC	"	A9	" " " "
8	47MMFD.	"	"	"	Tune for maximum output.	"	A10	" " " " Repeat Steps 5, 6, 7 & 8 until no further improvement can be made. Re-install chassis in cabinet with link closed.
9		Loop	1400KC	BC	Tune for maximum output.	"	A11	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

CRITICAL LEAD DRESS

1. Dress all AC leads away from volume control.
2. Dress lead from top tap on volume control to tone switch along front apron of chassis.
3. Dress resistors (42 & 45) down near chassis base.

RCA (VICTOR) MODEL
77V2 (Ch. RC-606-C)

RCA (VICTOR) MODEL
77V2 (Ch. RC-606-C)

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: RCA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	6SA7	6SA7	8R	
2	IF Amp.	6SK7	6SK7	8N	
3	Det.-AVC-Phase Inv.	6SQ7	6SQ7	8Q	
4	AF Amp.	6SQ7	6SQ7	8Q	
5	Power Output	6V6GT	6V6GT	7AC	
6	" "	6V6GT	6V6GT	7AC	
7	Rectifier	6X5GT	6X5GT	6S	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: RCA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
8A	20	450	71976	AF44J4A	UP2245C	DY-312	EL-312	■ Filter
B	30	350		*	*	*	*	▲ "
C	20	25		PRS450-10	BR1045	R-10-450	UT-20	Cathode Bypass
9	.0035	1000	70646	1084-004	MD16D4	STM-16-004	TR-24	Output Plate Bypass
10	.0035	1000	70646	1084-004	MD16D4	STM-16-004	TR-24	" " "
11	.02	400	70611	484-02	DT4S2	ST-4-02	TC-12	Audio Coupling
12	.01	400	70610	484-01	DT4S1	ST-4-01	TC-11	" "
13	.005	200	70606	484-005	DT6D5	ST-6-005	TC-25	" "
14	.01	400	70610	484-01	DT4S1	ST-4-01	TC-11	" "
15	.0025	400	70602	484-003	DT6D3	ST-6-003	TC-23	Tone Comp.
16	.015	200	70572	484-015	DT4S15	ST-2-02	TC-12	" "
17	.015	200	70572	484-015	DT4S15	ST-2-02	TC-12	" "
18	.0025	400	70602	484-003	DT6D3	ST-6-003	TC-23	Audio Coupling
19	.002	400	70601	484-002	DT6D2	ST-6-002	TC-22	Phono Tone Comp.
20	.01	400	70610	484-01	DT4S1	ST-4-01	TC-11	IF Screen Bypass
21	.05	200	70615	484-05	DT2S5	ST-2-05	TC-15	AVC Filter
22	.01	400	70610	484-01	DT4S1	ST-4-01	TC-11	Conv. Screen Bypass
23	120	300	71614	1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass-Cer.
24	56	300	71924	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.-Cer.
25	27	300	71615					Fixed Trimmer-Cer.
26	640	300	71613					" "
27	150	500	39632	1469-00015	5R5T15	MOS.5-315	MS-315	" "
28	120	300	71614	1468-0001	5W5T1	MO.5-31	1FM-31	RF Coupling-Cer.
29	150	500	39632	1469-00015	5W5T15	MOS.5-315	MS-315	Fixed Pad

*Parallel sections to obtain desired capacity.

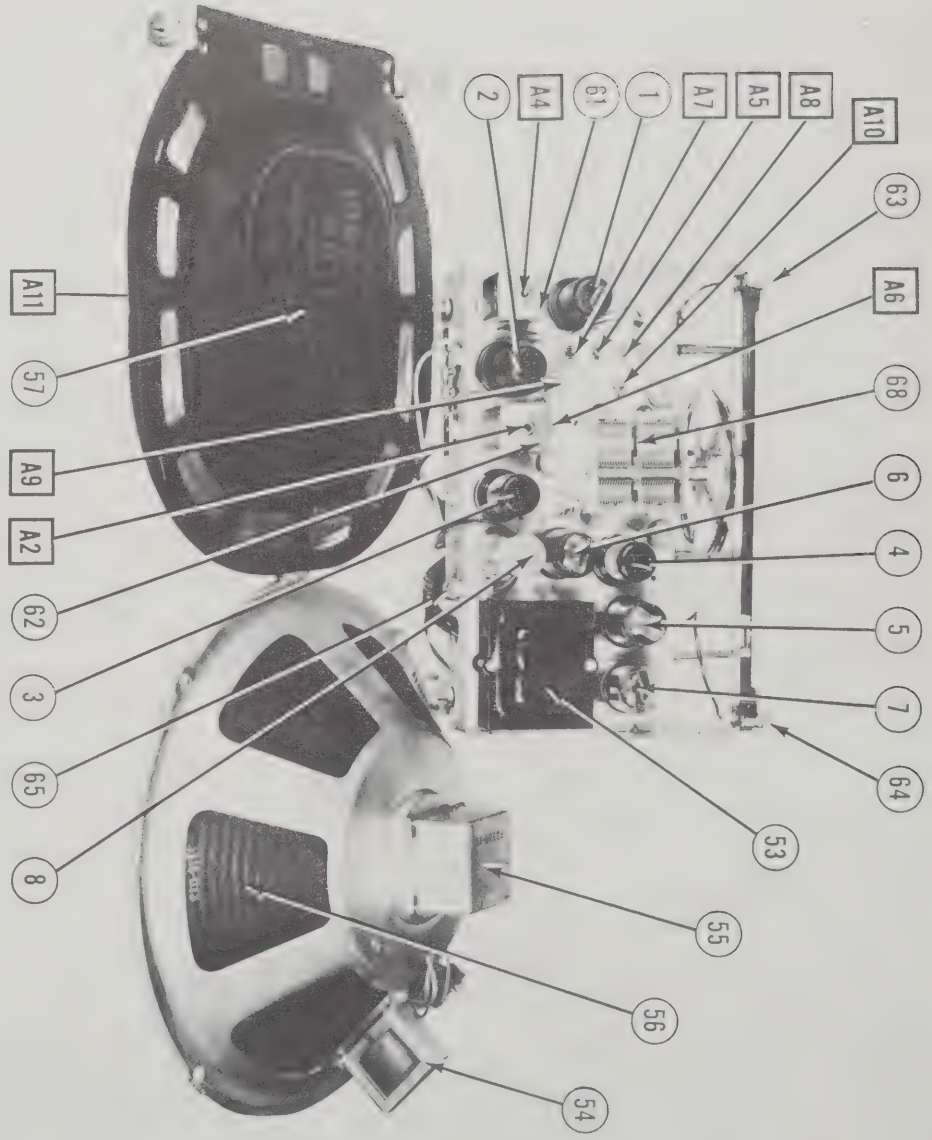
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: RCA PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
30A	1.5 Meg	½	70342	D18-137XX	T-95	Volume Control tapped @ 250KΩ & 500KΩ
B	Shaft		Not Req.	A	Not Req.	Attach to 30A per instructions
C	Switch		" "	41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: RCA PART No.	IRC PART No.	IDENTIFICATION CODES
31	2.2 Meg.	½		BTS-2.2 Meg.	Red-Red-Grn. Converter Grid
32	15KΩ	2		BT-2-15K	Br.-Grn.-Or. Converter Screen Dropping
33	22KΩ	½		BTS-22K	Red-Red-Or. Oscillator Grid
34	27KΩ	½		BTS-27K	Red-V1.-Or. IF Screen Dropping
35	56KΩ	½		BTS-56K	Grn.-Blue-Or. Bleeder
36	270KΩ	½		BTS-270K	Red-V1.-Y1. Tone Compensation
37	22KΩ	½		BTS-22K	Red-V1.-Or. " "
38	2.2 Meg.	½		BTS-2.2 Meg.	Red-Red-Grn. AVC Network
39	270KΩ	½		BTS-270K	Red-V1.-Y1. Diode Load
40	18KΩ	½		BTS-18K	Br.-Gray-Or. Tone Compensation

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	RCA PART No.	IRC PART No.	
41	22KΩ	½		BTS-22K	Red-Vi.-Or. Tone Compensation
42	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue AF Grid
43	270KΩ	½		BTS-270K	Red-Vi.-Yl. AF Plate Load
44	270KΩ	½		BTS-270K	Red-Vi.-Yl. Phase Inverter Plate Load
45	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue Phase Inverter Grid
46	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. Output Grid
47	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. " "
48	8200Ω	1		BTS-8200	Gray-Red-Red Output Grid
49	330Ω	1		BW-1-330	Or.-Or.-Br. Output Cathode
50	2200Ω	2		BT-2-2200	Red-Red-Red Filter
51	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. Phono Shunt
52	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Phono Tone Compensation

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	RCA PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
53	117V AC @ .46A	460V CT @ .066A	6.4V AC @ 3.5A		70127		T22R021	

†Drill new mounting holes.

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		RCA PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
54	11800Ω CT	2.2Ω	340Ω CT	.3Ω	37899	A-3823	T22S56†	A-2904	†Drill new mounting holes.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	VC IMP.	RCA PART No.	JENSEN PART No.	QUAM PART No.	
55	PM	2.2Ω	71961	ST-102# Mod. P12-S	12A4#	#Replace output transformer to match 6-8Ω voice coil.
	CONE DIA.	VC DIA.				
56	12"	1"	36145			

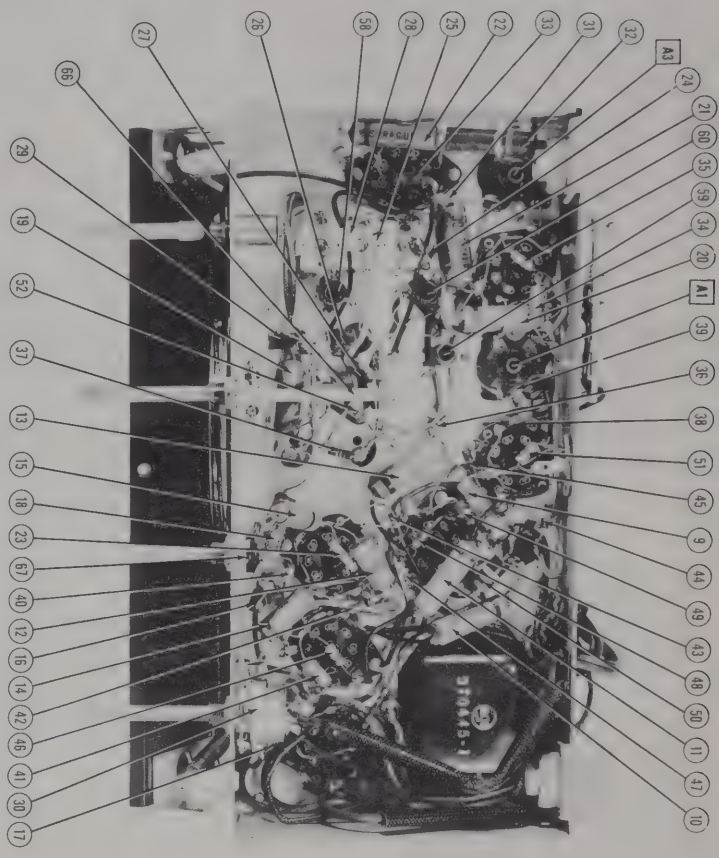
R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	RCA PART No.	MEISSNER PART No.
57	Loop Ant.	60Ω	.5Ω	71813	
58	SW Ant.Coil	0Ω	0Ω	71632	
59	BC Osc.Coil	.3Ω	2.8Ω	71623	
60	SW " "	1.2Ω	0Ω	71634	
61	Input IF	13Ω	12Ω	70128	
62	Output IF	11Ω	11Ω	70129	

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					RCA PART No.		
63	Bayonet	7.5	0.2	White	5117		Type 51
64-65	"	"	"	"	11765		" "

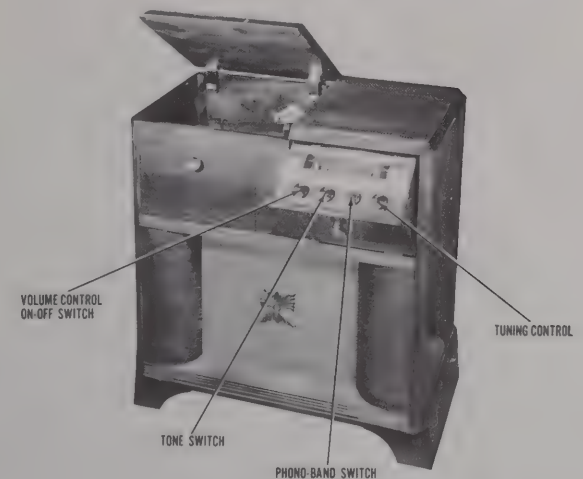
CHASSIS—BOTTOM VIEW

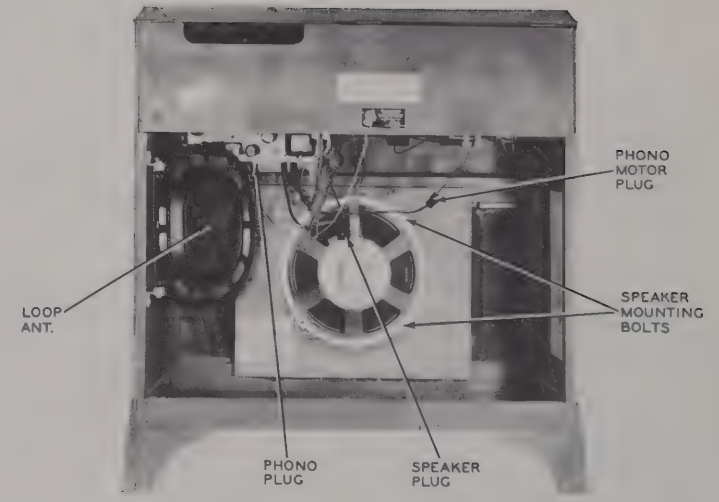


PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	RCA PART No.	NOTES
66	Switch	71602	Band-Phono
67	"	71603	Tone
68	2 Gang Var. Cap.	71600	(18-576MMF) each section
A5	Trimmer Strip	71610	BC Osc. Adj.
A7			SW Osc. Adj.
A8			SW Ant. Adj.
	Dial Scale	71817	Glass
	Dial Pointer	71808	
	Knob	71822	Band Phono or Tone
	"	71821	Volume or Tuning





DISASSEMBLY INSTRUCTIONS

1. Remove four push-on type control knobs.
2. Remove loop leads from loop antenna.
3. Remove two wood screws holding loop antenna in cabinet. Remove loop antenna from cabinet.
4. Remove phono-pickup plug from chassis.
5. Disconnect phone-motor plugs.
6. Remove speaker plug from speaker.
7. Remove short-wave antenna lead from chassis.
8. Remove pilot light from rear hanger compartment.
9. Remove four hex head self-tapping screws holding chassis in cabinet. Remove chassis from cabinet.
10. Remove three hex nuts holding speaker in cabinet. Remove speaker from cabinet.

DATE 5/43-#469-18
SET #39-FOLDER #18

VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SA7	0V.	0V.	195VDC	82VDC	-13VDC§	0V.	6.4VAC	0V.
2	6SK7	0V.	0V.	0V.	-.4VDC	0V.	85VDC	6.4VAC	212VDC
3	6SQ7	0V.	-.6VDC	0V.	-.4VDC	-2.8VDC	90VDC	0V.	6.4VAC
4	6SQ7	0V.	-.6VDC	0V.	0V.	0V.	92VDC	6.4VAC	0V.
5	6V6GT	0V.	0V.	247VDC	195VDC	0V.	0V.	6.4VAC	11VDC
6	6V6GT	0V.	0V.	247VDC	195VDC	0V.	0V.	6.4VAC	11VDC
7	6X5GT	0V.	0V.	230VAC	250VAC	230VAC	0V.	6.4VAC	250VDC

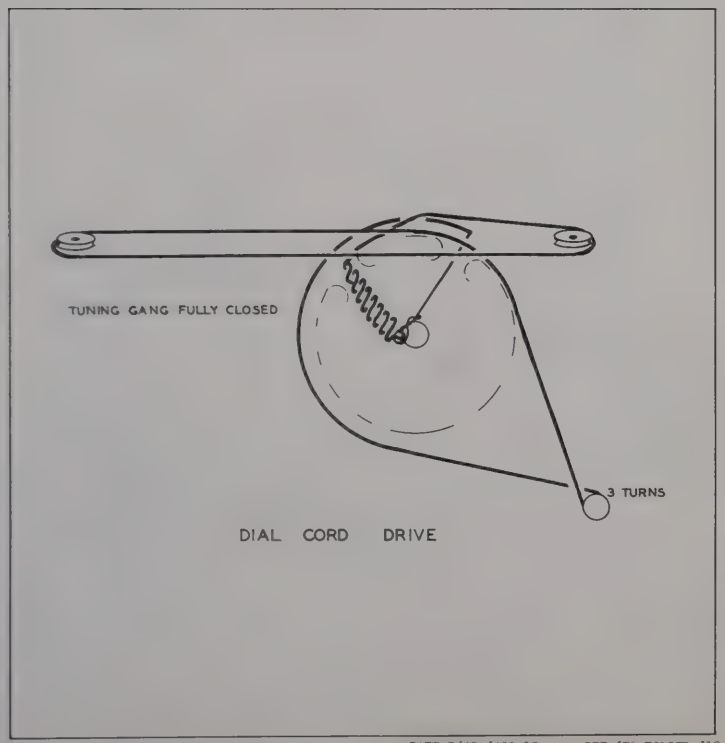
§TAKEN WITH VACUUM TUBE VOLTMETER.

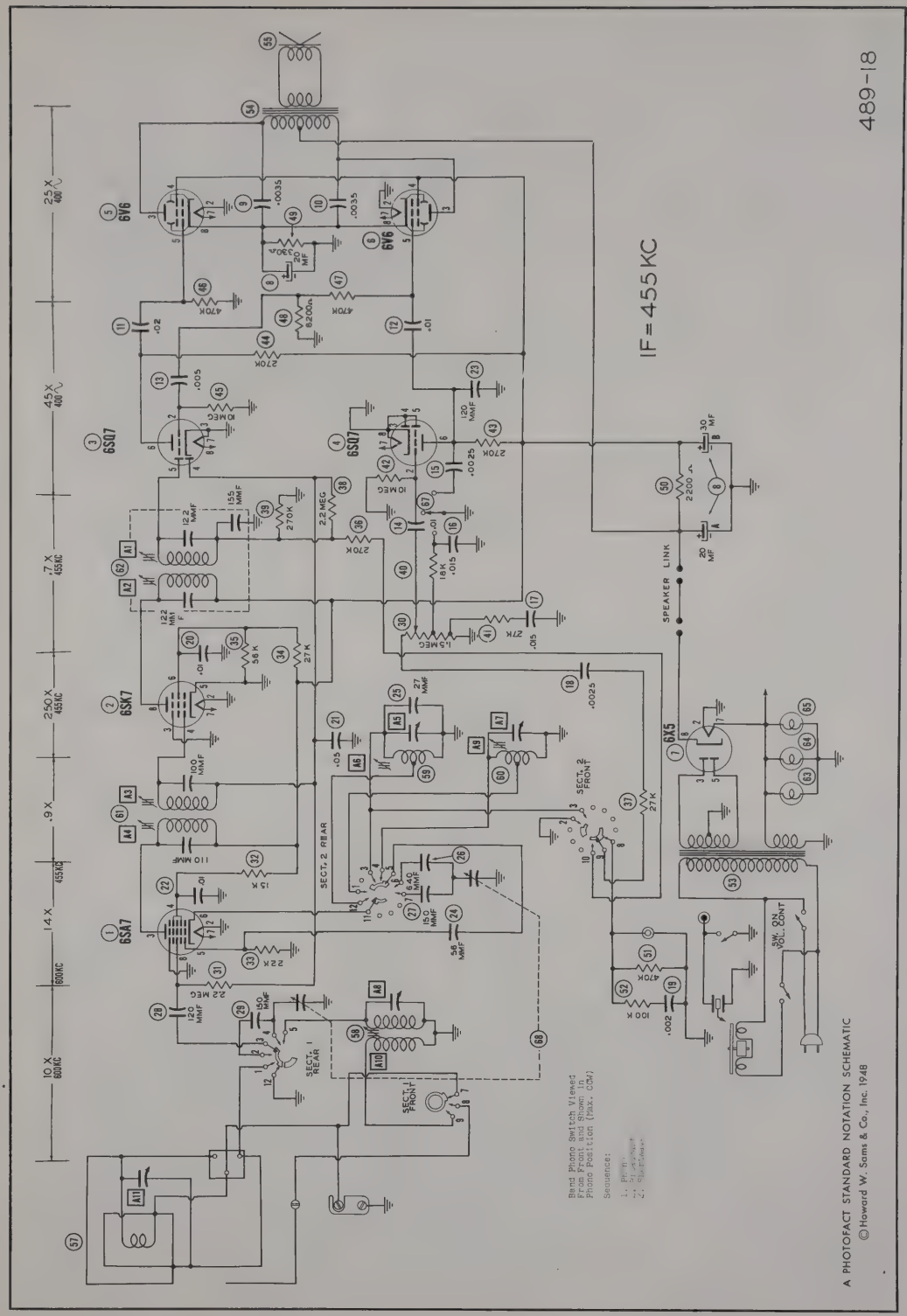
RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SA7	0Ω	0Ω	70KΩ	85KΩ	22KΩ	.3Ω	.1Ω	4.5 Meg.
2	6SK7	0Ω	0Ω	0Ω	2.4 Meg.	0Ω	56KΩ	.1Ω	70KΩ
3	6SQ7	0Ω	10 Meg.	0Ω	2.4 Meg.	270KΩ	340KΩ	0Ω	.1Ω
4	6SQ7	0Ω	10 Meg.	0Ω	0Ω	0Ω	340KΩ	.1Ω	0Ω
5	6V6GT	0Ω	0Ω	70KΩ	70KΩ	470KΩ	27KΩ	.1Ω	330Ω
6	6V6GT	0Ω	0Ω	70KΩ	72KΩ	470KΩ	8.2KΩ	.1Ω	330Ω
7	6X5GT	0Ω	0Ω	190Ω	70KΩ	200Ω	INF.	.1Ω	70KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

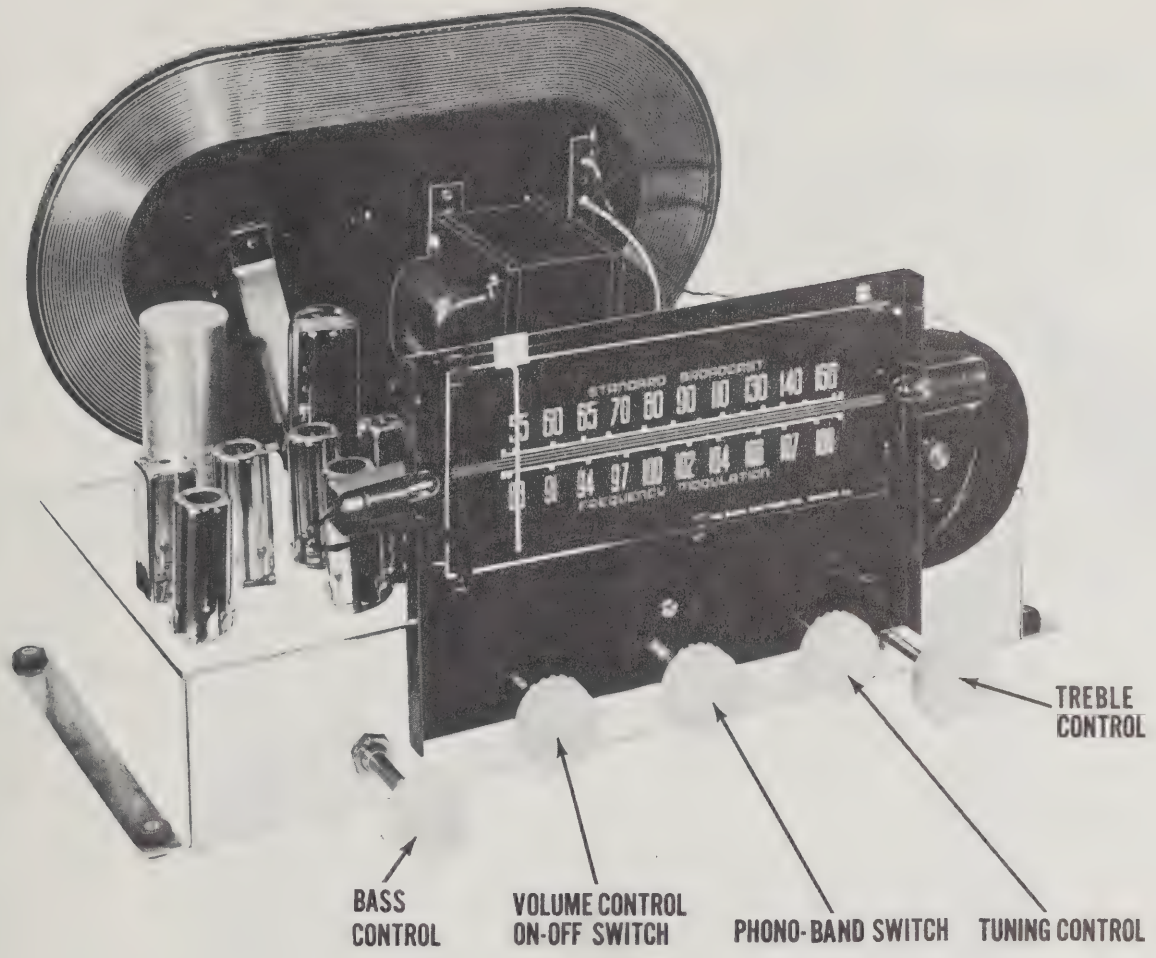
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.





The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

RADIO CRAFTSMEN MODELS
RC-1 (Tuner), RC-2 (Audio Amp.)



RADIO CRAFTSMEN MODELS
RC-1 (Tuner), RC-2 (Audio Amp.)

TRADE NAME	Radio Craftsmen, Models RC-1 (Tuner), RC-2 (Audio Amp.)
MANUFACTURER	The Radio Craftsmen, Inc., 1341 South Michigan Ave., Chicago 5, Ill.
TYPE SET	AC Operated AM-FM Tuner and Audio Amplifier with Seperate Power Supplies
TUBES (FIFTEEN)	Types, 6BA6 RF Amp., 6J6 Osc.-AFC, 6BE6 Mixer, 6BA6 1st IF Amp., 6BA6 FM 2nd IF Amp.-AM Det.-AVC, 6AU6 1st Limiter, 6AU6 2nd Limiter, 6AL5 FM Det., 6C4 AF Amp., 5Y3GT Rectifier, 6J5 1st AF Amp., 6SN7GT 2nd AF-Phase Inv., (2) 6V6GT Power Output, 5Y3GT Rectifier.
POWER SUPPLY	110-120 Volts AC — RATING 1.74 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1600KC — FREQ. MOD. 88-108MC

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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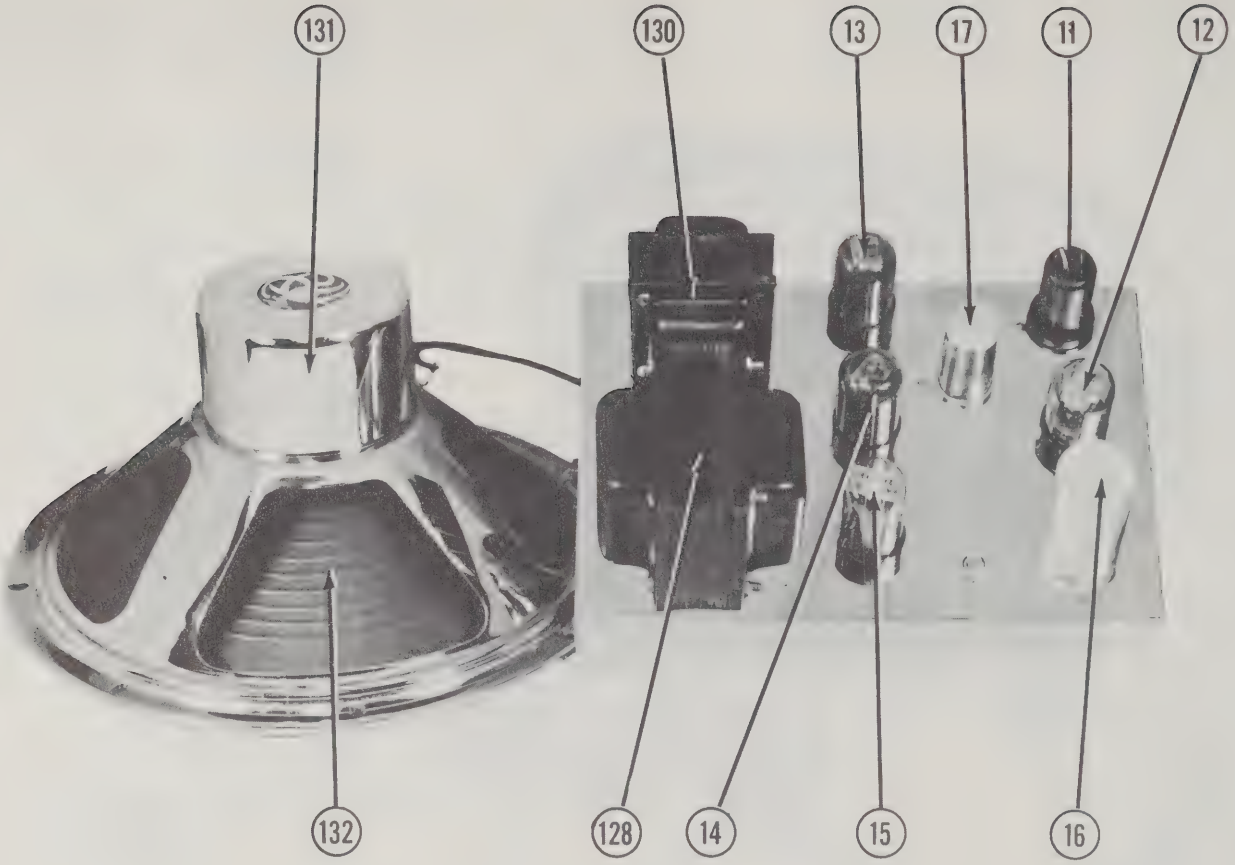
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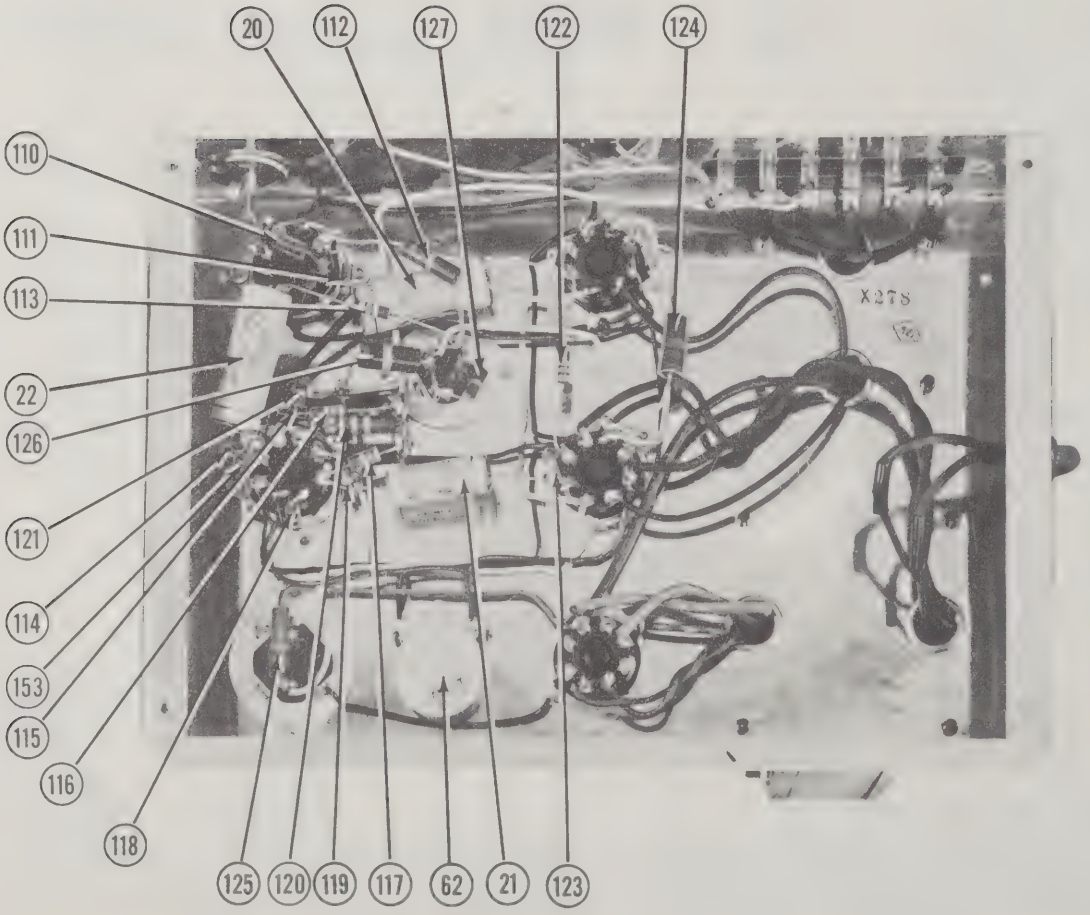
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RC-1 (Tuner), RC-2 (Audio Amp.)

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: RADIO CRAFTSMEN PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	6BA6	6BA6	7BK	
2	Osc. AFC	6J6	6J6	7BF	
3	Mixer	6BE6	6BE6	7CH	
4	1st IF Amp.	6BA6	6BA6	7BK	
5	FM 2nd IF-AM Det.-AVC	6BA6	6BA6	7BK	
6	1st Limiter	6AU6	6AU6	7BK	
7	2nd Limiter	6AU6	6AU6	7BK	
8	FM Det.	6AL5	6AL5	6BT	
9	AF Amp.	6C4	6C4	6BG	
10	Rectifier	5Y3GT	5Y3GT	5T	
11	1st AF Amp.	6J5	6J5	6Q	
12	2nd AF-Phase Inv	6SN7GT	6SN7GT	8BD	
13	Power Output	6V6GT	6V6GT	7AC	
14	" "	6V6GT	6V6GT	7AC	
15	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: RADIO CRAFTS. PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
16A	60	400	18S001	AF4444J*	UP222245*	DY-4x20-450*	EL-420*	◓ Filter
B	20	400						▲ Output Screen Bypass
17A	40	200	18S002	AF64K4A		DY-309	EL-354	▲ Filter
B	10	200						■ AF Decoupling
C	25	25						Cathode Bypass
18A	40	400	18S003	AF88J	UP4445	DY-406‡	EL-442*	◓ Filter
B	40	400						◪ "
C	20	300		PKS350/24	BR2045		UT-203	▲ "
19	.01	600	18X210	484-01	DT6S1	MPH-6-01	TC-11	Line Filter
20	.1	400	18X201	484-.1	DT4P1	ST-4-1	TC-1	Audio Coupling
21	.02	400	18X202	484-02	DT4S2	ST-4-02	TC-12	" "
22	.1	400	18X201	484-.1	DT4P1	ST-4-1	TC-1	" "
23	.01	400	18X208	484-01	DT4S1	ST-4-01	TC-11	Tone Comp.
24	.05	400	18X206	484-05	DT4S5	ST-4-05	TC-15	" "
25	.01	400	18X208	484-01	DT4S1	ST-4-01	TC-11	" "
26	.01	400	18X208	484-01	DT4S1	ST-4-01	TC-11	" "
27	.25	200	18X209	484-.25	DT2P25	ST-2-25	TC-2	Audio Coupling
28	.02	400	18X202	484-02	DT4S2	ST-4-02	TC-12	" "
29	.02	400	18X202	484-02	DT4S2	ST-4-02	TC-12	AVC Filter
30	.05	400	18X206	484-05	DT4S5	ST-4-05	TC-15	AF Bypass
31	.05	400	18X206	484-05	DT4S5	ST-4-05	TC-15	AVC Filter
32	1500	350	18X607	1467-0015	1R5D15	MW.5-215	1FM-215	De-emphasis
33	100	500	18X605	1468-0001	5W5T1	MO.5-31	1FM-31	RF Bypass
34	5000	400	18X608	1467-005	1D5D5	MW.5-25	1FM-25	2nd Lim. Decoupling
35	5000	400	18X608	1467-005	1D5D5	MW.5-25	1FM-25	2nd Lim. Screen Bypass
36	5000	400	18X608	1467-005	1D5D5	MW.5-25	1FM-25	RF Bypass Pwr. Supply
37	22	500	18X603	1468-000025	5W5Q2	MOS.5-42	MS-42	IF Coupling
38	5000	400	18X608	1467-005	1D5D5	MW.5-25	1FM-25	1st Lim. Screen Bypass
39	47	500	18X604	1468-00005	5W5Q5	MO.5-45	1FM-45	RF Bypass
40A	5000	400	18X608	1467-005	1D5D5	MW.5-25	1FM-25	Cathode Bypass
B	5000	400	18X608	1467-005	1D5D5	MW.5-25	1FM-25	Screen Bypass
C	5000	400	18X608	1467-005	1D5D5	MW.5-25	1FM-25	Decoupling
41A	150	400	†	1468-00015	5W5T15	MO.5-315	1FM-315	Diode RF Filter
B	150	400	†	1468-00015	5W5T15	MO.5-315	1FM-315	" " "
42	5000	400	18X608	1467-005	1D5D5	MW.5-25	1FM-25	1st IF Decoupling
43	5000	400	18X608	1467-005	1D5D5	MW.5-25	1FM-25	1st IF Screen Bypass
44	5000	400	18X608	1467-005	1D5D5	MW.5-25	1FM-25	Filament Bypass
45	5000	400	18X608	1467-005	1D5D5	MW.5-25	1FM-25	Mixer Decoupling
46	5000	400	18X608	1467-005	1D5D5	MW.5-25	1FM-25	Mixer Screen Bypass
47	47	500	18X604	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Coupling
48	47	500	18X604	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.
49	5000	400	18X608	1467-005	1D5D5	MW.5-25	1FM-25	Osc. Cathode Bypass
50	47	500	18X604	1468-00005	5W5Q5	MO.5-45	1FM-45	RF Bypass
51	470	500	18X606	1468-0005	5W5T5	MO.5-35	1FM-35	Osc. Feedback
52	22	500	18X603	1468-000025	5W5Q2	MOS.5-42	MS-42	Reactance Mod. Coupling
53	100	500	18X605	1468-0001	5W5T1	MO.5-31	1FM-31	Reactance Mod. Grid Cap.
54	5000	400	18X608	1467-005	1D5D5	MW.5-25	1FM-25	RF Bypass Power Supply

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: RADIO CRAFTSMAN PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
100	47KΩ	½	23X022	BTS-47K	Yl.-Vi.-Or. De-emphasis
101	100KΩ	½	23X026	BTS-100K	Br.-Blk.-Yl. Discriminator Diode Load
102	100KΩ	½	23X026	BTS-100K	Br.-Blk.-Yl. " " "
103	330Ω	½	23X018	BW-½-330	Or.-Or.-Br. AF Cathode Bias
104	22KΩ	2	23X401	BT-2-22K	Red-Red-Or. AF Cathode Bias
105	47KΩ	½	23X022	BTS-47K	Yl.-Vi.-Or. AF Plate Load
106	47KΩ	½	23X022	BTS-47K	Yl.-Vi.-Or. Tone Compensation
107	22KΩ	½	23X021	BTS-22K	Red-Red-Or. " "
108	1000Ω	10		AB-1000	Filter-See Note 1
109	1000Ω	5	23X602	AB-1000	"
110	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. AF Grid
111	330Ω	½	23X018	BW-½-330	Or.-Or.-Br. AF Cathode Bias
112	22KΩ	1		BTA-22K	Red-Red-Or. AF Cathode Bias
113	470KΩ	½	23X025	BTS-470K	Yl.-Vi.-Yl. AF Plate Load
114	470KΩ	½	23X025	BTS-470K	Yl.-Vi.-Yl. 2nd AF Grid
115	1000Ω	½	23X019	BTS-1000	Br.-Blk.-Red 2nd AF Cathode
116	470KΩ	½	23X025	BTS-470K	Yl.-Vi.-Yl. 2nd AF Plate Load
117	470KΩ	½	23X025	BTS-470K	Yl.-Vi.-Yl. Phase Inverter Plate Load
118	10KΩ	½	23X020	BTS-10K	Br.-Blk.-Or. Phase Inverter Cathode
119	220KΩ	½		BTS-220K	Red-Red-Yl. Phase Inverter Grid
120	47KΩ	1		BTA-47K	Yl.-Vi.-Or. Bleeder
121	10KΩ	½	23X020	BTS-10K	Br.-Blk.-Or. Feedback
122	330KΩ	½		BTS-330K	Or.-Or.-Yl. Output Grid
123	470KΩ	½	23X025	BTS-470K	Yl.-Vi.-Yl. " "
124	220Ω	2		BW-2-220	Red-Red-Br. Output Cathode
125	2200Ω	1		BTA-2200	Red-Red-Red Output Screen Dropping
126	10KΩ	2		BT-2-10K	Br.-Blk.-Or. Filter
127	10KΩ	½	23X020	BTS-10K	Br.-Blk.-Or. 1st AF Decoupling

†Items 84, 41A & 41B can be obtained as one unit under Part #18X609.
Note 1 - Later production uses 500Ω in this application. IRC replacement AB-500.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: RADIO CRAFTSMEN PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: THORDARSON PART No.	REPLACEMENT DATA: MERIT PART No.
128	117V AC @ .75A	650V CT @ .092A	5.2V AC @ 2.0A	6.5V AC @ 2.0A	19S202	P-4079§	T22R31§	P-3152§
129	117V AC @ .96A	700V CT @ .115A	5.2V AC @ 2.0A	6.5V AC @ 3.2A	19S201	P-4080§	T22R32§	P-3153§

§Drill new mounting holes.

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: RADIO CRAFTSMEN PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: THORDAR'N PART No.	REPLACEMENT DATA: MERIT PART No.	INSTALLATION NOTES
130	10KΩ CT	4Ω 6Ω 8Ω 15Ω 500Ω	500Ω CT	.7Ω .8Ω .9Ω 1.2Ω 32Ω	19S004		T22S64	A-3132	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: RADIO CRAFTSMEN PART No.	REPLACEMENT DATA: JENSEN PART No.	REPLACEMENT DATA: QUAM PART No.	INSTALLATION NOTES
131	FIELD	VC IMP.	RC12M	ST-103 ‡	12AD6	‡Use 8Ω tap.
	PM	5.3Ω		Mod. P12-R		
	CONE DIA.	VC DIA.				
132	11½"	1"				

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	RADIO CRAFTS. PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
55	15	500	18X602		5W5Q2	MOS.5-42	MS-415	Conv. Grid Leak Cap.
56	470	500	18X606	1468-0005	5W5T5	MO.5-35	1FM-35	RF Coupling
57	15	500	18X602		5W5Q2	MOS.5-42	MS-415	RF Coupling
58A	5000	400	18X608	1467-005	1D5D5	MW.5-25	1FM-25	RF Cathode Bypass
B	5000	400	18X608	1467-005	1D5D5	MW.5-25	1FM-25	RF Screen Bypass
C	5000	400	18X608	1467-005	1D5D5	MW.5-25	1FM-25	RF Decoupling
153	470	300	18X606	1468-0005	5W5T5	MO.5-35	1FM-35	AF Plate Bypass

†Items 41A, 41B and 84 can be obtained as one unit under Part #18X608.
*Parallel sections to obtain desired capacity.
#Omit one section.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	RADIO CRAFTSMEN PART No.	IRC PART No.	CLAROSTAT PART No.	
59A	500KΩ-Dual	½	23S704	33-3333		Volume Control
B	Shaft		Not Req.	C3#		Attach to 59A per instructions
C	Switch		" "	21		" " " " "
60A	10KΩ	½	23S702	D11-116	AM-27-S	Treble Control
B	Shaft		Not Req.	E	KSS-3	Attach to 60A per instructions
61A	500KΩ	½	23S703	D13-133	AM-58-S	Bass Control
B	Shaft		Not Req.	E	KSS-3	Attach to 61A per instructions
62	100Ω	1	23S801	W-100	43-100	Hum Balance Control

#Use part of original shaft and C3 coupler to obtain knurled shaft.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	RADIO CRAFTSMEN PART No.	IRC PART No.	
63	68Ω	½	23X016		Blue-Gray-Blk. RF Cathode
64	22KΩ	½	23X021	BTS-22K	Red-Red-Or. RF Screen Dropping
65	2200Ω	½	23X011	BTS-2200	Red-Red-Red RF Plate Load
66	1000Ω	½	23X019	BTS-1000	Br.-Blk.-Red RF Decoupling
67	1000Ω	½	23X019	BTS-1000	Br.-Blk.-Red Oscillator Plate Load
68	22KΩ	½	23X021	BTS-22K	Red-Red-Or. Oscillator Grid
69	220Ω	½	23X017		Red-Red-Br. Oscillator Cathode
70	220Ω	½	23X017		Red-Red-Br. Parasitic Suppressor
71	100KΩ	½	23X023	BTS-100K	Br.-Blk.-Yl. Reactance Modulator Grid Isolation
72	470KΩ	½	23X026	BTS-470K	Yl.-Vi.-Yl. AF Filter
73	6800Ω	1	23X201	BTA-6800	Blue-Gray-Red Reactance Plate Load
74	47KΩ	½	23X022	BTS-47K	Yl.-Vi.-Or. Converter Grid
75	1 Meg.	½	23X026	BTS-1 Meg.	Br.-Blk.-Grn. Converter Grid
76	22KΩ	½	23X021	BTS-22K	Red-Red-Or. Oscillator Grid
77	1 Meg.	½	23X026	BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
78	10KΩ	1	23X203	BTA-10K	Br.-Blk.-Or. Converter Screen Dropping
79	1000Ω	½	23X019	BTS-1000	Br.-Blk.-Red Converter Decoupling
80	47KΩ	½	23X022	BTS-47K	Yl.-Vi.-Or. AVC Network
81	68Ω	½	23X106		Blue-Gray-Blk. 1st IF Cathode
82	33KΩ	1	23X206	BTA-33K	Or.-Or.-Or. 1st IF Screen Dropping
83	1000Ω	½	23X019	BTS-1000	Br.-Blk.-Red 1st IF Decoupling
84	47KΩ	½	†	BTS-47K	Yl.-Vi.-Or. Diode RF Filter
85	470KΩ	½	23X026	BTS-470K	Yl.-Vi.-Yl. Diode Load
86	68Ω	½	23X016		Blue-Gray-Blk. 2nd IF Cathode
87	33KΩ	1	23X206	BTA-33K	Or.-Or.-Or. 2nd IF Screen Dropping
88	1000Ω	½	23X019	BTS-1000	Br.-Blk.-Red 2nd IF Decoupling
89	100KΩ	½	23X023	BTS-100K	Br.-Blk.-Yl. Limiter Grid
90	2.2 Meg.	½	23X027	BTS-2.2 Meg.	Red-Red-Grn. AVC Network
91	2.2 Meg.	½	23X027	BTS-2.2 Meg.	Red-Red-Grn. " "
92	470KΩ	½	23X026	BTS-470K	Yl.-Vi.-Yl. Tone Compensation
93	10KΩ	½	23S702	BTS-10K	Br.-Blk.-Or. 1st Limiter Plate Load
94	22KΩ	1		BTA-22K	Red-Red-Or. 1st Limiter Screen Dropping
95	22KΩ	½	23X021	BTS-22K	Red-Red-Or. Bleeder
96	150KΩ	½	23X024	BTS-150K	Br.-Grn.-Yl. 2nd Limiter Grid
97	22KΩ	1		BTA-22K	Red-Red-Or. 2nd Limiter Screen Dropping
98	22KΩ	½	23X021	BTS-22K	Red-Red-Or. Bleeder
99	1000Ω	½	23X019	BTS-1000	Br.-Blk.-Red 2nd Limiter Plate Decoupling

DATE 5/48-#489-19 SET #39-FOLDER #19

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

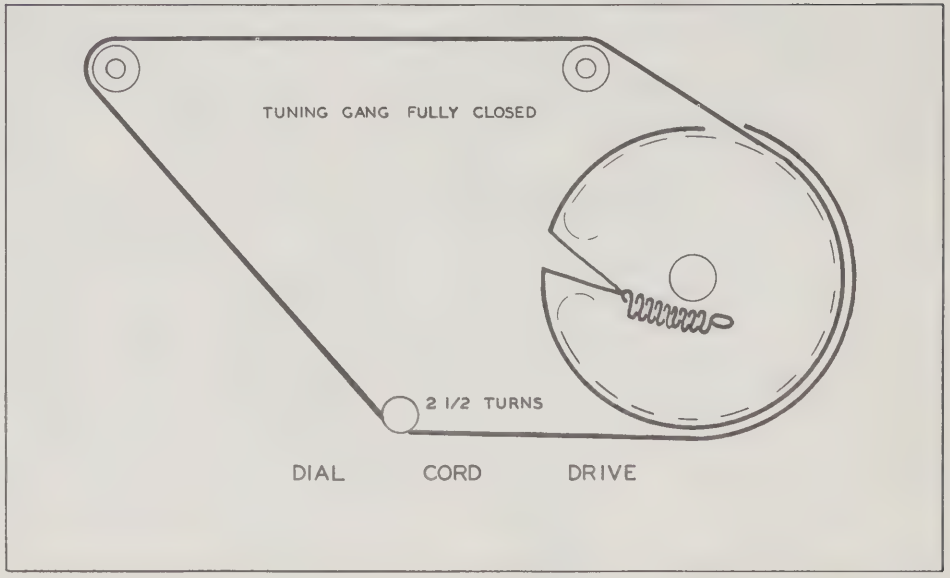
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	RADIO CRAFTSMEN PART No.	MEISSNER PART No.	
133	Loop Ant.	.1Ω	.8Ω	5S602		
134	Wave Trap		32Ω	5S207		
135	FM Ant.			7X401		
136	FM Ant.Coil		0Ω	5A210		
137	FM RF Coil		0Ω	5A208		
138	AM Osc.Coil	1Ω	5Ω	5S206	14-1060	
139	FM Osc.Coil	0Ω	0Ω	5A205		
140	1st AM IF	15Ω	15Ω	5X003	16-6678	
141	1st FM IF	.4Ω	.4Ω	5X004		
142	2nd AM IF	15Ω	15Ω	5X003	16-6678	
143	2nd FM IF	.4Ω	.4Ω	5X004		
144	3rd FM IF	.4Ω	.4Ω	5X004		
145	FM Disc.	.4Ω	.4Ω	5X005		
146	FM RF Plate Load		.1Ω	5S402		
147	RF Choke		.1Ω	5S402		

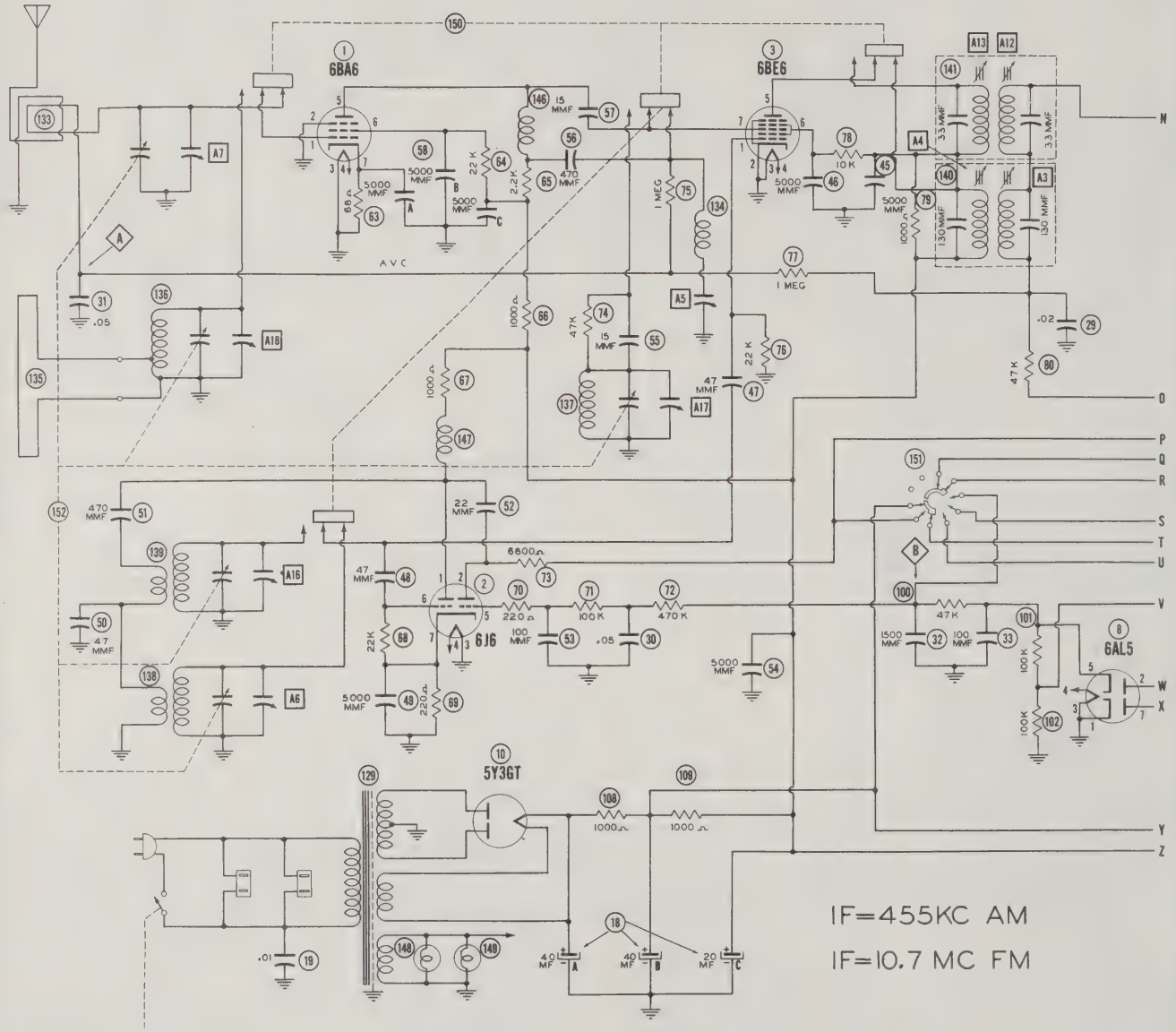
DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					RADIO CRAFTSMEN PART No.		
148	Bayonet	6-8	0.25	Blue			Type 44
149	"	6-8	0.25	"			" "

MISCELLANEOUS

ITEM No.	PART NAME	RADIO CRAFTSMEN PART No.	NOTES
150	Switch	4B002	Band (Slide)
151	"	4S003	Band-Phono-Tele. (Rotary)
152	Tuning Gang	17B004	AM (11-431 MMF, 8-170 MMF)
A5	Padder	17X202	BC Osc. Adj.





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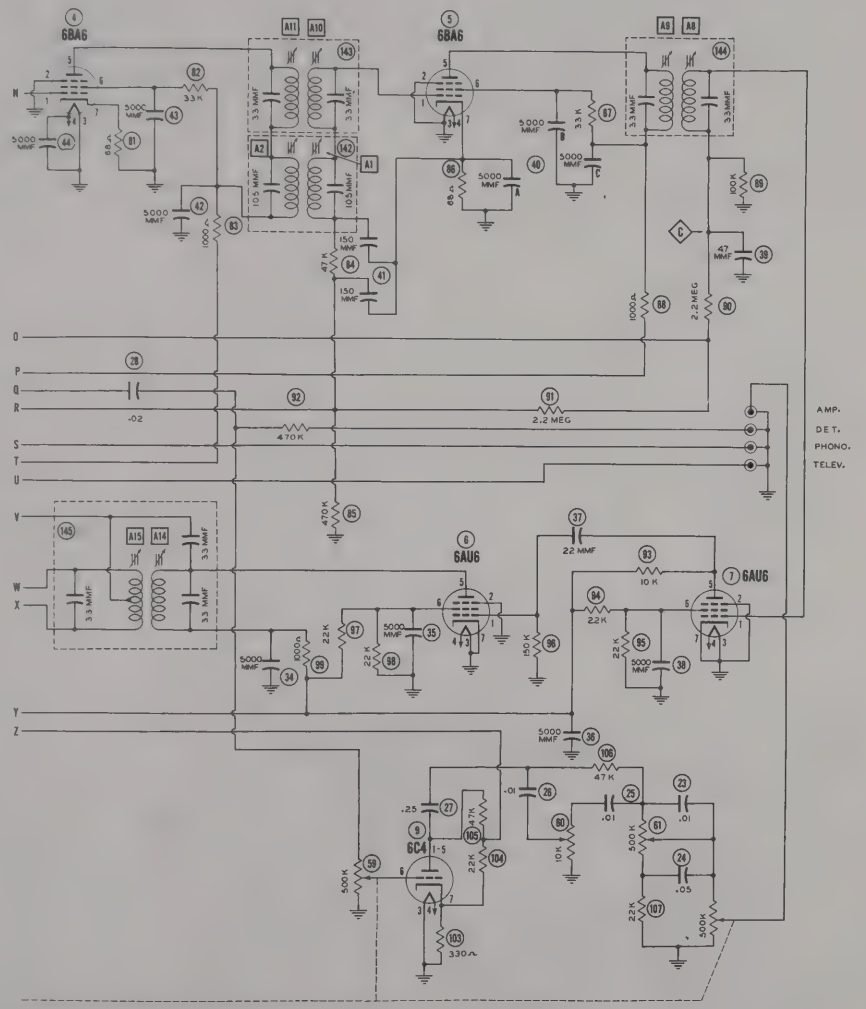

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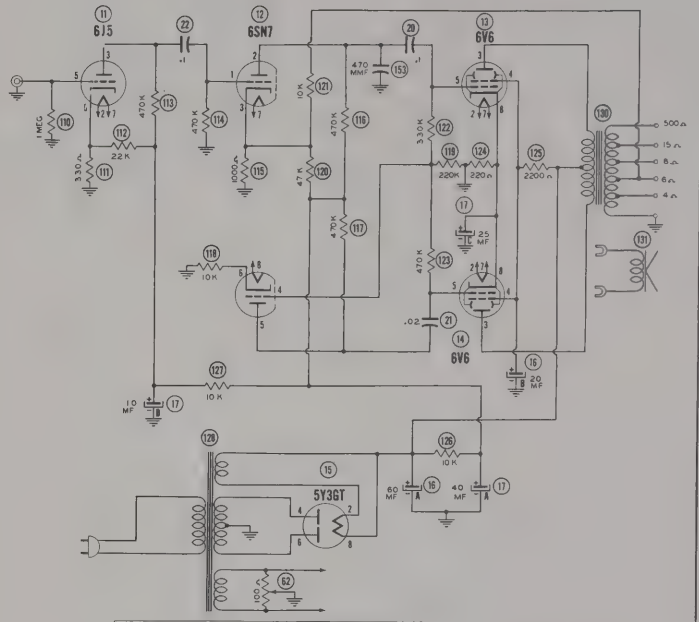

STAGE GAIN MEASUREMENTS

ANTENNA TO RF GRID	30X	
RF GRID TO CONVERTER GRID	2X	
CONVERTER GAIN	8.5X	
INPUT IF TRANSFORMER	1.5X	
IF TUBE	150X	
OUTPUT IF TRANSFORMER	.8X	
AUDIO	6X	
AUDIO	18X	
PHASE INVERTER	5X	
OUTPUT	20X	

placement of probes, ... absolute reading is impractical. ... connecting negative (-) 3 volts t...

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VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6BA6	0V.	0V.	0V.	0.7VDC	1.3VDC	1.3VDC	6.3VAC	-
2	6AV6	215VDC	-	0V.	0.6VDC	-	-4VDC§	6.3VAC	-
‡ 2	6AV6	-	215VDC	0V.	0.6VDC	-.5VDC	-.5VDC	6V.	-
3	6BA6	-.7VDC§	0V.	0V.	0.7VDC	2.5VDC	1.3VDC	0V.	-
4	6AL5	0V.	0V.	0V.	0.6VDC	0.6VDC	1.3VDC	0V.	-
5	6BA6	-.7VDC	0V.	0V.	0.7VDC	-.7VDC	-.4VDC	0V.	-
‡ 5	6AL5	0V.	0V.	0V.	0.6VDC	0.6VDC	1.3VDC	0V.	-
‡ 6	6AV6	-.8VDC	0V.	0V.	0.7VDC	0.7VDC	0V.	6.3VAC	-
‡ 7	6BA6	-.7VDC	0V.	0V.	0.7VDC	2.5VDC	1.3VDC	0V.	-
‡ 8	6AV6	0V.	0V.	0V.	0.6VDC	-.8VDC	0V.	-.8VDC	-
9	6Z4	0V.	0V.	0V.	0.6VDC	0V.	0V.	6.3VDC	-
10	6AV6	0V.	0V.	0V.	0.6VDC	0V.	0V.	6.3VAC	6.3VAC
11	6AL5	0V.	0V.	0V.	0.6VDC	0V.	0V.	6.3VAC**	6VDC
12	6AV6	0V.	0V.	0V.	0.6VDC	0V.	0V.	6.3VAC**	6.3VAC**
13	6AV6	0V.	0V.	0V.	0.6VDC	0V.	0V.	6.3VAC**	6VDC
14	6AV6	0V.	0V.	0V.	0.6VDC	0V.	0V.	6.3VAC**	6VDC
15	6AV6	0V.	0V.	0V.	0.6VDC	0V.	0V.	0V.	350VAC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6BA6	6.8 Meg.	0Ω	0Ω	.1Ω	10KΩ	35KΩ	0Ω	-
2	6AV6	1MΩ	-	0Ω	.1Ω	-	42KΩ	220Ω	-
‡ 2	6AV6	-	1MΩ	0Ω	.1Ω	10KΩ	42KΩ	220Ω	-
3	6BA6	1MΩ	0Ω	0Ω	.1Ω	10KΩ	38KΩ	3.5 Meg.	-
4	6AL5	1.5 Meg.	0Ω	0Ω	.1Ω	10KΩ	42KΩ	0Ω	-
5	6BA6	4.5MΩ	0Ω	0Ω	.1Ω	INF.	INF.	0Ω	-
‡ 5	6AV6	4.5MΩ	0Ω	0Ω	.1Ω	42KΩ	45KΩ	0Ω	-
‡ 6	6AV6	50KΩ	0Ω	0Ω	.1Ω	1.1KΩ	14KΩ	0Ω	-
‡ 7	6BA6	50KΩ	0Ω	0Ω	.1Ω	10KΩ	12KΩ	0Ω	-
‡ 8	6AV6	0Ω	1.1MΩ	0Ω	.1Ω	3.5MΩ	0Ω	1.1KΩ	-
9	6Z4	50KΩ	INF.	.1Ω	0Ω	50KΩ	50KΩ	32Ω	-
10	6AV6GT	INF.	1MΩ	INF.	42Ω	INF.	0Ω	INF.	10KΩ
11	6AL5	0Ω	11.5Ω	1MΩ	INF.	1 Meg.	INF.	11.5Ω	730Ω
12	6AV6GT	47MΩ	4MΩ	1MΩ	42KΩ	4MΩ	1MΩ	11.5Ω**	11.5Ω**
13	6AV6GT	0Ω	11.5Ω**	0MΩ	0MΩ	55KΩ	INF.	11.5Ω**	220Ω
14	6AV6GT	0Ω	11.5Ω**	0MΩ	0MΩ	600KΩ	600KΩ	11.5Ω**	220Ω
15	6AV6GT	INF.	30KΩ	INF.	0Ω	INF.	75Ω	INF.	25KΩ

‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

**READINGS TAKEN WITH HUM BALANCE CONTROL CENTERED.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

RADIO CRAFTSMEN MODELS RC-1 (Tuner), RC-2 (Audio Amp.)

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to flat reference mark at low freq. end of dial.
Use insulated alignment screwdriver with 1/16" thick blade for all adjustments.

AM ALIGNMENT

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.01 MFD	High side to Pin 7 (grid) of 6BA6. Low side to chassis.	455KC	BC (fully counter-clock-wise)	Tuning cap. fully open.	Across voice coil	A1, A2, A3, A4.	Adjust for maximum output.
2	.01 MFD	High side to ext. Low side to chassis.	"	"	"	"	A5	Adjust for zero deflection.
3	220Ω MFD	"	1500KC	"	1500KC	"	A6	Adjust for maximum output.
4	220Ω MFD	"	"	"	Tune for maximum output.	"	A7	"

FM ALIGNMENT USING AM SIGNAL GENERATOR VTVM & OUTPUT METER

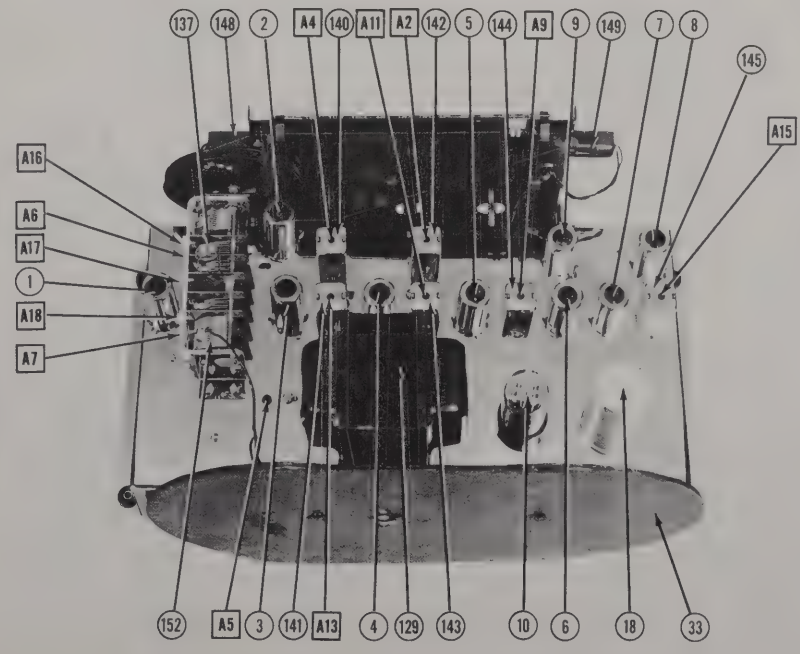
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5	.01 MFD	High side to Pin 7 (grid) of 6BA6. Low side to chassis.	10.7MC (unmodulated)	FM (center position)	Tuning cap. fully open.	DC probe to Point ◇. Common to chassis.	A8, A9, A10, A11, A12, A13, A14.	Adjust for maximum deflection.
6	.01 MFD	"	"	"	"	DC probe to Point ◇. Common to chassis.	A15	Adjust for zero deflection.
						OUTPUT METER		
7	3000Ω carbon res.	High side to ungrounded FM ant. terminal. Low side to grounded terminal.	104MC (4000 amplitude modulation)	"	104MC	Across voice coil	A16	Disconnect resistor (72) from Point ◇ and connect to chassis. Adjust for maximum output.
8	"	"	"	"	Tune for maximum output.	"	A17, A18	Rock tuning cap. and adjust for maximum output. Reconnect resistor (72).

FM ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use freq. modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	SCOPE CONNECT	ADJUST	REMARKS
5	.01 MFD	High side to Pin 1 of 6BA6 1st IF Tube (4). Low side to chassis.	10.7MC (freq. modulated)	FM (center position)	Tuning cap. fully open.	Bartlett-Hall Radio Ground ◇ to chassis	A8, A9, A10, A11, A12, A13, A14.	Adjust for maximum amplitude, symmetry and coincidence of pattern per Fig. 1.
6	.01 MFD	High side to Pin 7 of 6BA6. Low side to chassis.	"	"	"	"	A15, A13	"
7	.01 MFD	High side to Pin 1 of 6BA6 2nd IF Tube (5). Low side to chassis.	"	"	"	Vertical input to Point ◇. Ground to chassis.	A14, A15	Use full vertical gain of scope and attenuate output of sig. gen. to just give usable pattern. This is to prevent saturation of limiters. Alternately adjust A14 for maximum amplitude of pattern and A15 for maximum straightness of maximum slopes with an even number of lines at center of pattern per Fig. 1.
8	3000Ω carbon res.	High side to ungrounded FM ant. terminal. Low side to grounded terminal.	104MC	FM	104MC	Vertical input to Point ◇. Ground to chassis.	A16	Disconnect resistor (72) from Point ◇ and connect to chassis. Adjust for maximum amplitude, symmetry and coincidence of pattern per Fig. 1. Reconnect resistor (72) to Point ◇.
9	"	"	"	"	Tune for coincidence of pattern.	"	A17, A18	Rock tuning cap. to keep pattern coincident and adjust for maximum amplitude of pattern per Fig. 1. Reconnect resistor (72) to Point ◇.

CHASSIS—TOP VIEW



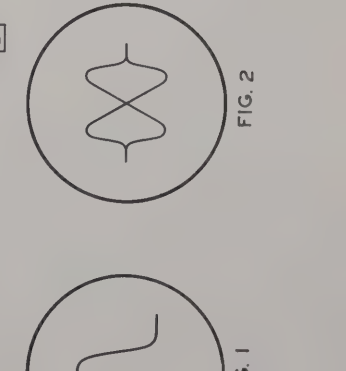
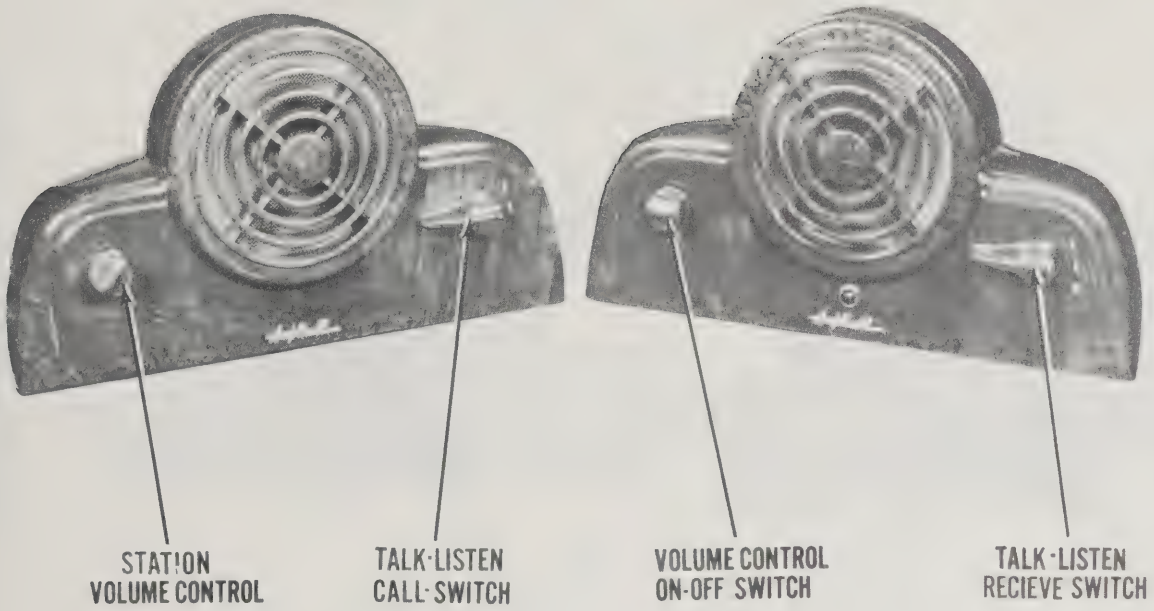


FIG. 1

FIG. 2

RAULAND (AMPLICALL) MODELS 2101A (Master Station), 2100-S (Sub-Station)

RAULAND (AMPLICALL) MODELS 2101A (Master Station), 2100-S (Sub-Station)



RAULAND (AMPLICALL) MODELS 2101A (Master Station), 2100-S (Sub-Station)

TRADE NAME	Rauland (Amplicall), Model 2101A (Master Station), 2100-S (Sub-Station)
MANUFACTURER	Rauland Corp., 4245 N. Knox Ave., Chicago 41, Ill.
TYPE SET	AC-DC Operated Inter Communication System
TUBES (THREE)	Types, 12AU6 AF Amp., 50B5 Power Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-DC RATING .22 Amp. @ 117 Volts AC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12AU6	0V.	1VDC	0V.	13VAC	50VDC	18VDC	1VDC
2	50B5	0V.	7VDC	64VAC	13VAC	105VDC	102VDC	0V.
3	35W4	0V.	0V.	85VDC	117VDC	142VAC	112VAC	125VDC

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12AU6	560Ω	6.8KΩ	0Ω	11Ω	900KΩ	2.7 Meg.	6.8KΩ
2	50B5	100KΩ	150Ω	58Ω	11Ω	500KΩ	500KΩ	100KΩ
3	35W4	INF.	0Ω	200Ω	210Ω	205Ω	205Ω	500KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - Volume control at minimum, no signal applied for voltage measurements.

HOWARD W. SAMS & CO., INC. **Indianapolis Indiana**

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DATE 5/48-#489-20 SET #39-FOLDER #20

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: RAULAND PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	AF Amp.	12AU6	12AU6	7PK	
2	Power Output	6AB5	6AB5	7BZ	
3	Rectifier	35W4	35W4	5BC	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: RAULAND PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
4A	30	150	CE-806F	PRS-A40302	EDL4215	DSB-303	TA-330	Filter-Red
B	30	150					" - "	
C	20	25					TA-25	Cathode Bypass-Blue
5A	20	150	CE-406L	PRSA150-20-20	EDL2215	DSB-2x20-150	TA-220	Filter - Red
B	20	25						Cathode Bypass-Yl.
6	.05	600		684-05	DT6S5	S-6-05	TC-15	AF Screen Bypass
7	.1	400		464-.1	DT4P1	S-4-.1	TC-1	Line Isolation
8	220	500		1468-00025	5W5T25	MO.5-325	1FM-325	Audio Coupling
9	220	500		1468-00025	5W5T25	MO.5-325	1FM-325	Tone Comp.

CONTROLS

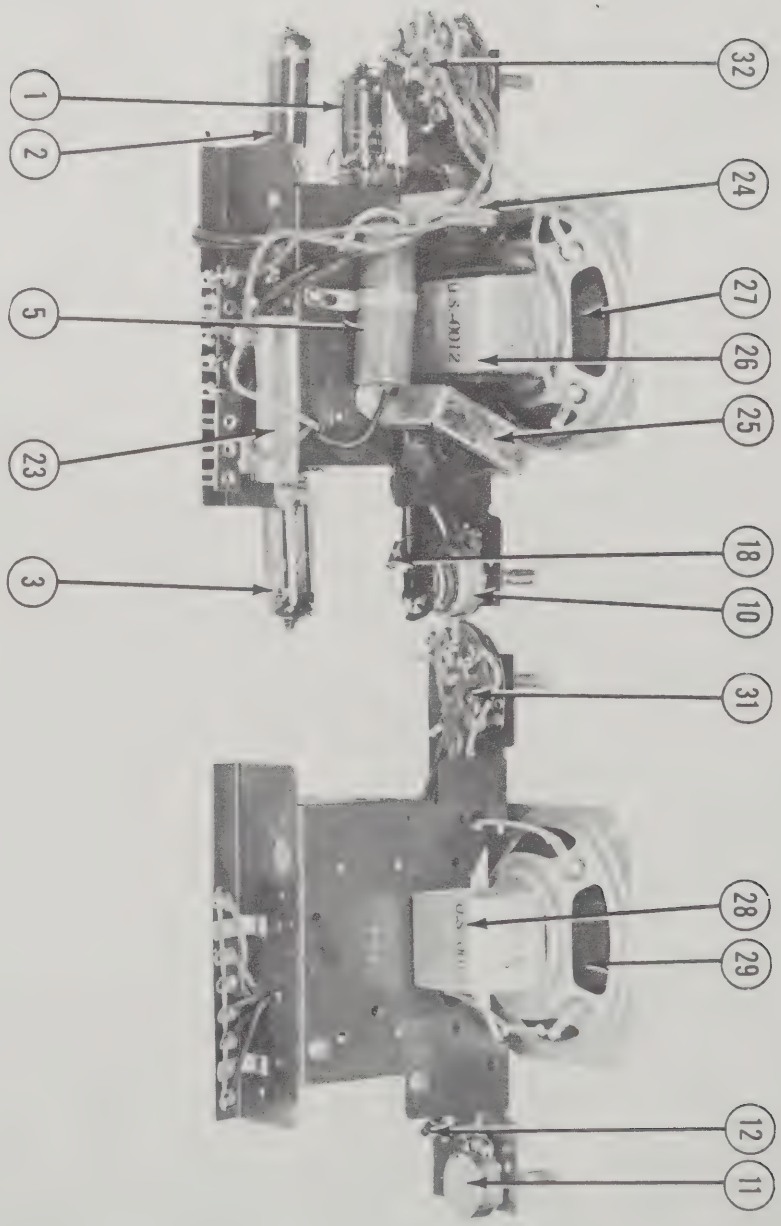
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: RAULAND PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
10A	500KΩ	½	RP-504Y	D13-133	AM-60-Z	Master volume control
B	Shaft		Not Req.	E	KSS-3	Attach to 10A per instructions
C	Switch		" "	41	SW-A	" " " " "
11A	500Ω	½	RP-501A	D11-103	AM-5-S	Sub. Volume Control
B	Shaft		Not Req.	E	KSS-3	Attach to 11A per instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: RAULAND PART No.	IRC PART No.	IDENTIFICATION CODES
12	200Ω	½		BW-½-220	Red-Blk.-Br. Input Network
13	68Ω	½		BW-½-68	Blue-Gray-Blk. " "
14	33Ω	½		BW-½-33	Or.-Blk.-Blk. " "
15	6800Ω	½		BTS-6800	Blue-Gray-Red AF Cathode
16	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AF Plate Load
17	2.2 Meg.	½		BTS-2.2 Meg.	Red-Red-Grn. AF Screen Dropping
18	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Series Volume Control
19	150Ω	½		BW-½-150	Br.-Grn.-Br. Output Cathode
20	1500Ω	½		BTS-1500	Br.-Gr.-Red Filter
21	470Ω	1		BTw-470	Yl.-Vi.-Br. "
22	1Ω	½		BW-½-1	Br.-Grn.-Gold Surge Limiter
23	1.5KΩ	5		AB-150	Line Dropping -See Note

Note-On IRC replacement set slider @ 130Ω from one end.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (INPUT)

ITEM No.	RATING			REPLACEMENT DATA				INSTALLATION NOTES
	TURNS RATIO	DC RES.		RAULAND	STANCOR	THORDAR'N	MERIT	
	PRI. to SEC.	PRI.	SEC.	PART No.	PART No.	PART No.	PART No.	
24	1 to 15	7Ω CT	560Ω	LA-0043	A-4708*	T20A00*	.	*Drill new mounting holes.

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		RAULAND	STANCOR	THORDAR'N	MERIT	
	PRI.	SEC.	PRI.	SEC.	PART No.	PART No.	PART No.	PART No.	
25	1400Ω	8Ω	55Ω	4.1Ω	LO-0056			A-2502	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			RAULAND PART No.	JENSEN PART No.	QUAM PART No.	
26	FIELD PM	VC IMP. 50Ω	US-0012			
27	CONE DIA. 3-3/8"	VC DIA. 1/2"				
28	FIELD PM	VC IMP. 50Ω	US-0012			
29	CONE DIA. 3-3/8"	VC DIA. 1/2"				

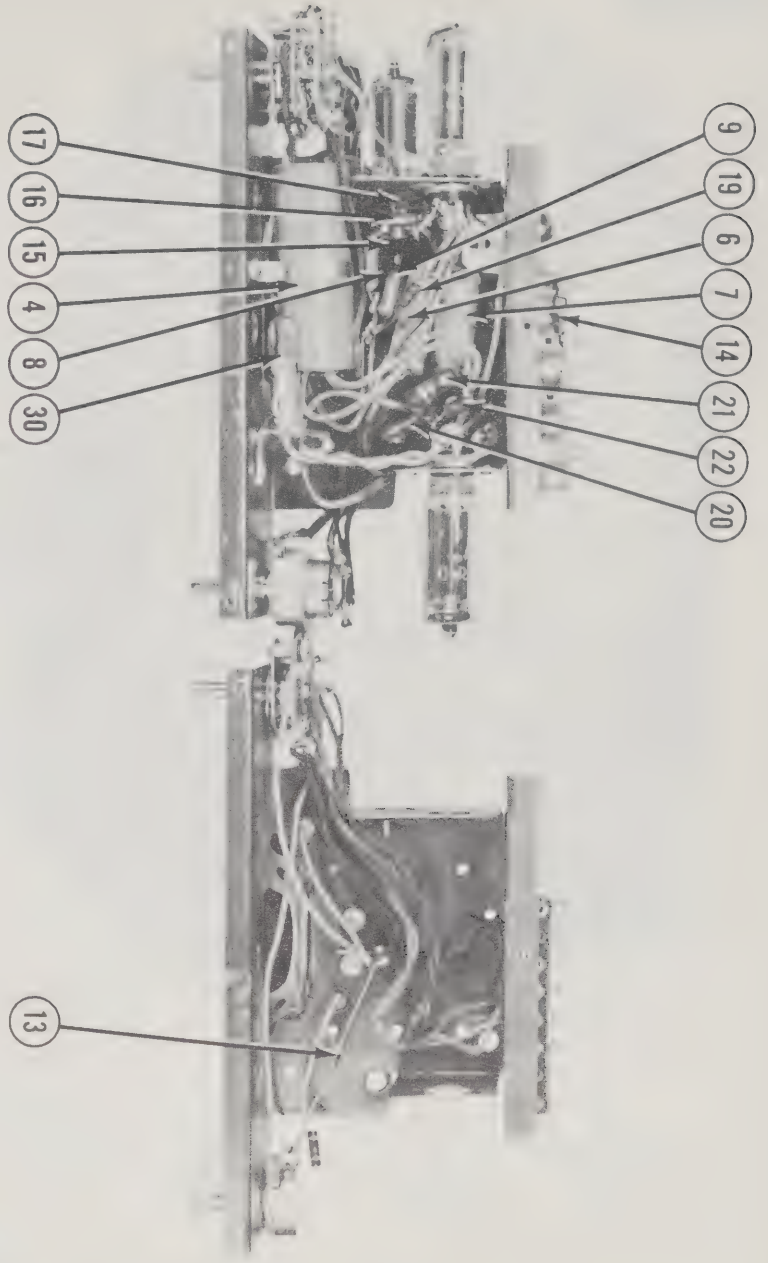
DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					RAULAND PART No.		
30	Bayonet	6-8	0.15	Brown			Type 47

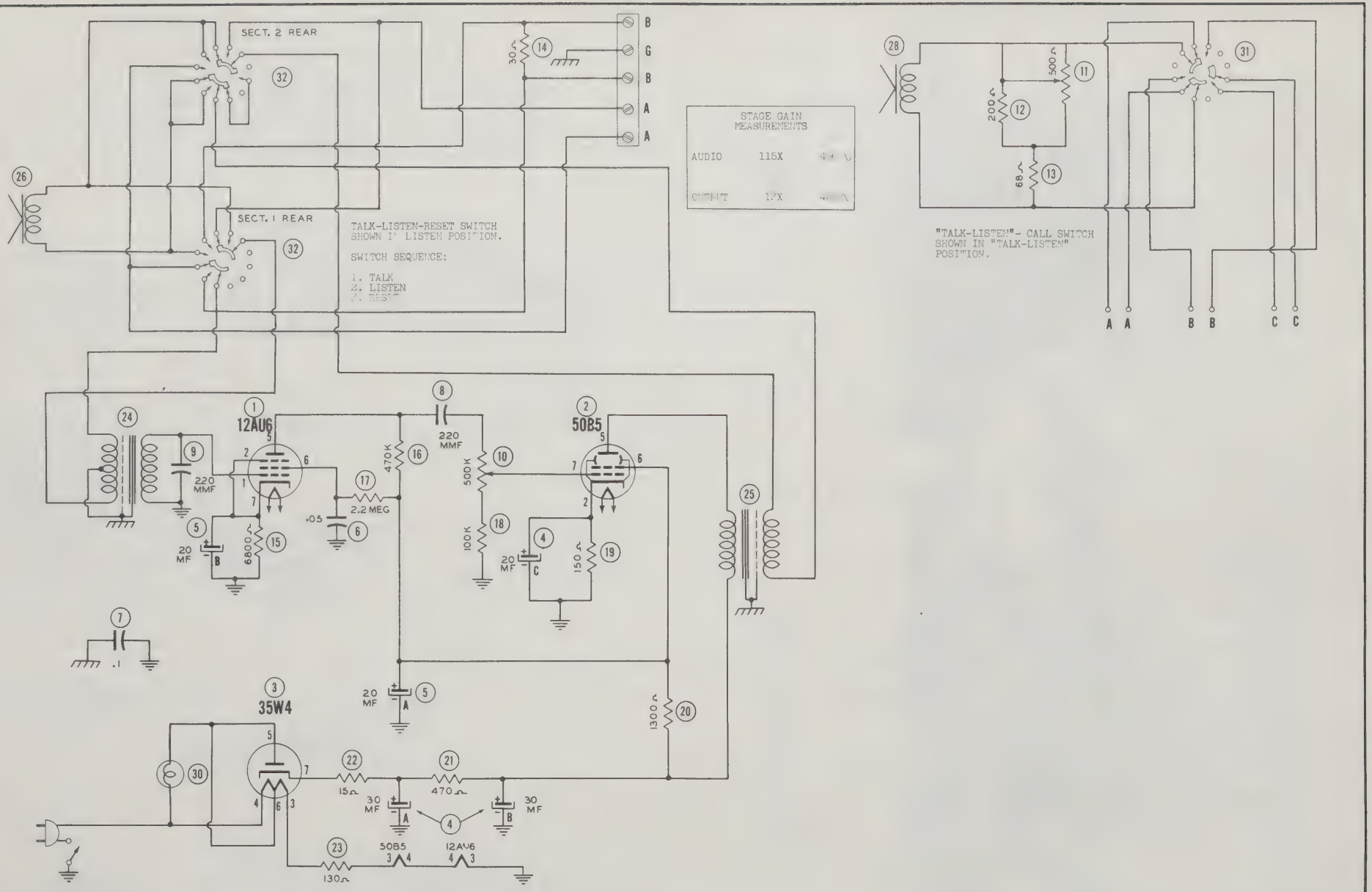
MISCELLANEOUS

ITEM No.	PART NAME	RAULAND PART No.	NOTES
31	Switch	X-0210	Talk-Listen/Call
32	"	X-0211	Talk-Listen-Reset

CHASSIS—BOTTOM VIEW



DATE 5/42-#499-20
SET #20-FOLDER #20
RAULAND (AMPLICALL)
MODELS 210A, 210C-S



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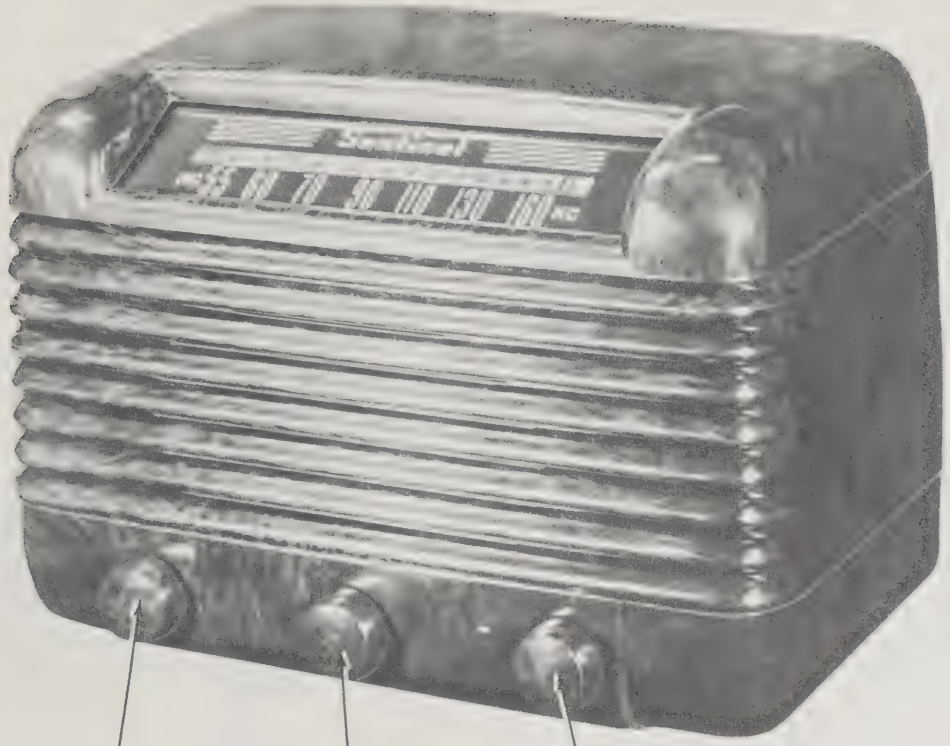
SENTINEL MODELS 313-I, 313W,
IU-313-I, IU-313W



SENTINEL MODELS 313-I, 313W,
IU-313-I, IU-313W

SENTINEL MODEL 313W

TRADE NAME	Sentinel, Models 313-I, 313W, IU-313-I, IU-313W
MANUFACTURER	Sentinel Radio Corp., 2100 W. Dempster St., Evanston, Ill.
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (SIX)	Types, 12SK7 RF Amp., 12SA7 Converter, 12SK7 IF Amp., 12SQ7 Det.-AVC-AF, 35L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	110-120 Volts AC-DC
TUNING RANGE—BROADCAST	530-1650KC RATING .24 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer 1-7/8" from left edge of dial backplate.

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.2 MFD.	High side to Pin 8 (grid) of 12SA7. Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation.
2	200MMFD	High side to ext. ant. lead. Low side to ground.	"	Tuning cap. fully closed.	"	A5	Adjust for minimum output.
3	200MMFD	"	1600KC	6-7/8" from left edge of dial backplate.	"	A6	Adjust for maximum output.
4	200MMFD	"	1400KC	Tune for maximum output.	"	A7	" " " "

HOWARD W. SAMS & CO., Indianapolis Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: SENTINEL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	12SK7	12SK7	8N	
2	Converter	12SA7	12SA7	8R	
3	IF Amp.	12SK7	12SK7	8N	
4	Det.-AVC-AF	12SQ7	12SQ7	8Q	
5	Power Output	35L6GT	35L6GT	7AC	
6	Rectifier	35Z5GT	35Z5GT	6AL	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SENTINEL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7A	50	150	25E6	PRSA150-50-50	UP5515	DSB-2x50-150	TA-505	Filter
B	50	150						"
8	.05	400	23E416	484-.5	DT4S5	ST-4-05	TC-15	Line Filter
9	.01	400	23E411	484-01	DT4S1	ST-4-01	TC-11	Output Plate Bypass
10	.005	400	23E408	484-005	DT6D5	ST-6-005	TC-25	Audio Coupling
11	.002	400	23E405	484-002	DT6L2	ST-6-002	TC-22	Tone Compensation
12	.005	600	23E408	684-005	DT6D5	ST-6-005	TC-25	Audio Coupling
13	.01	400	23E411	484-01	DT4S1	ST-4-01	TC-11	RF Screen Bypass
14	.05	200	23E216	484-05	DT2S5	ST-4-05	TC-15	AVC Filter
15	.2	400	23E421	484-.2	DT4P2	ST-4-2	TC-2	Line Isolation-See Note
16	100	500	23E39	1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass
17	250	500	23E42	1468-00025	5W5T25	MO.5-325	1FM-325	Diode RF Filter
18	100	500	23E39	1468-0001	5W5T1	MO.5-31	1FM-31	Tone Comp.
19	50	500	23E37	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.
20	220	500	23E42	1468-00025	5W5T25	MO.5-325	1FM-325	RF Coupling

Note-Used in IU Series only.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SENTINEL PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
21A	500KΩ	½	28E7	D13-133#	AM-60-Z#	Volume Control
B	Shaft		Not Req.	E*	KSS-3*	Attach to 21A per instructions
C	Switch		" "	41	SW-A	" " " " "
22A	500KΩ	½	28E8	D13-133	AM-60-Z	Tone Control
B	Shaft		Not Req.	E	KSS-3	Attach to 22A per instructions

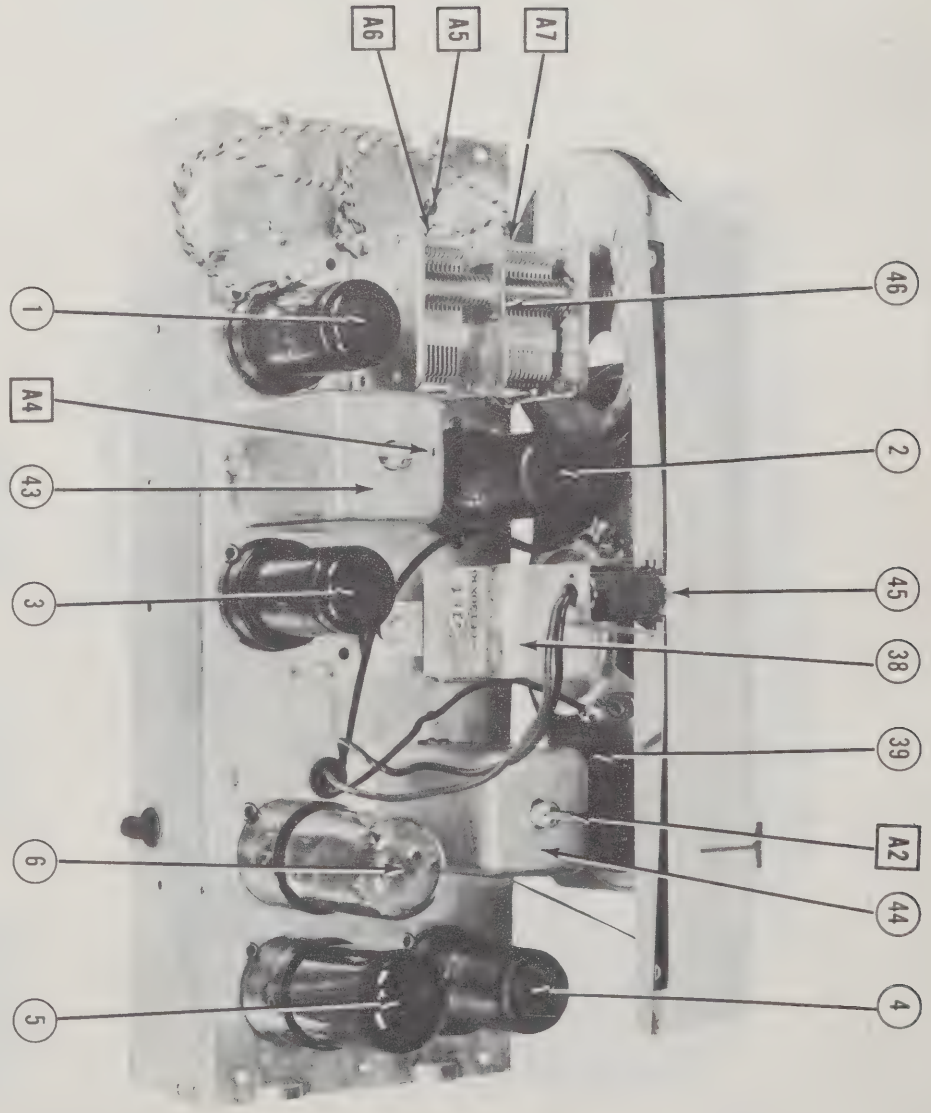
#Install a 47KΩ resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Controls viewed from shaft side, terminals down.)
*Wrap scotch tape around shaft adjacent to lock ring for dial cord surface.

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SENTINEL PART No.	IRC PART No.	IDENTIFICATION CODES
23	47KΩ	½	27E473	BTS-47K	Yl.-Vi.-Or. RF Screen Dropping
24	8200Ω	½	27E822	BTS-820J	Gray-Red-Red RF Plate Load
25	220KΩ	½	27E224	BTS-220K	Red-Red-Yl. Converter Grid
26	22KΩ	½	27E223	BTS-22K	Red-Red-Or. Oscillator Grid
27	20 Meg.	½	27E206	BTS-22 Meg.	Red-Blk.-Blue AVC Network
28	3.3 Meg.	½	27E335	BTS-3.3 Meg.	Or.-Or.-Grn. AF Grid
29	470KΩ	½	27E474	BTS-470K	Yl.-Vi.-Yl. AF Plate Load
30	470KΩ	½	27E474	BTS-470K	Yl.-Vi.-Yl. Output Grid
31	150Ω	½	27E151	BW-½-150	Br.-Grn.-Br. Output Cathode
32	3.3 Meg.	½	27E335	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
33	1000Ω	1	27E102-3	BTA-1000	Br.-Blk.-Red Filter
34	100Ω	2	27E101-2	BW-2-100	Br.-Blk.-Br. Pilot Light Shunt
35	47Ω	2	27E470-2	BW-2-47	Yl.-Vi.-Blk. Surge Limiter
36	220KΩ	½	27E224	BTS-220K	Red-Red-Yl. Line Isolation-See Note

Note-Used in IU series only.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		SENTINEL PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
37	4500Ω	3.6Ω	250Ω	.9Ω	22E8	A-3876‡	T22S45‡	A-2928‡	‡Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			SENTINEL PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.				
38	PM	3.6Ω	1E1		46A1†	†Fabricate new mounting bracket.
	CONE DIA.	VC DIA.				
39	4"x6"	1/2"				

R F COILS

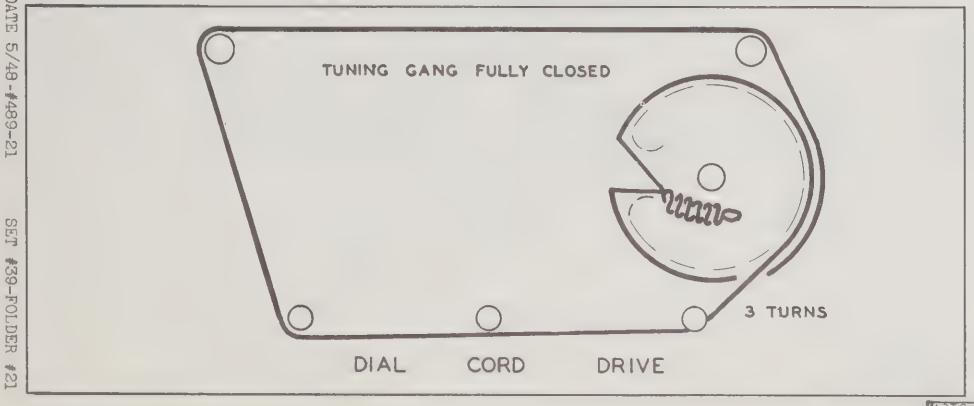
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	SENTINEL PART No.	MEISSNER PART No.	
40A	Loop Ant.	0Ω	1.7Ω	7E149		
B	" "			7E150		Alternate
41	Wave Trap		57Ω	2E19		
42	Osc. Coil	.5Ω	8.5Ω	20E64	14-1060	
43A	Input IF	9.5Ω	9.5Ω	20E307	16-5740	
B	" "			20E261	16-5740	Alternate
44A	Output IF	9.5Ω	9.5Ω	20E307-2	16-5742	
B	" "			20E261-2	16-5742	Alternate

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					SENTINEL PART No.		
45	Bayonet	6-8	0.15	Brown	40E1		Type 47

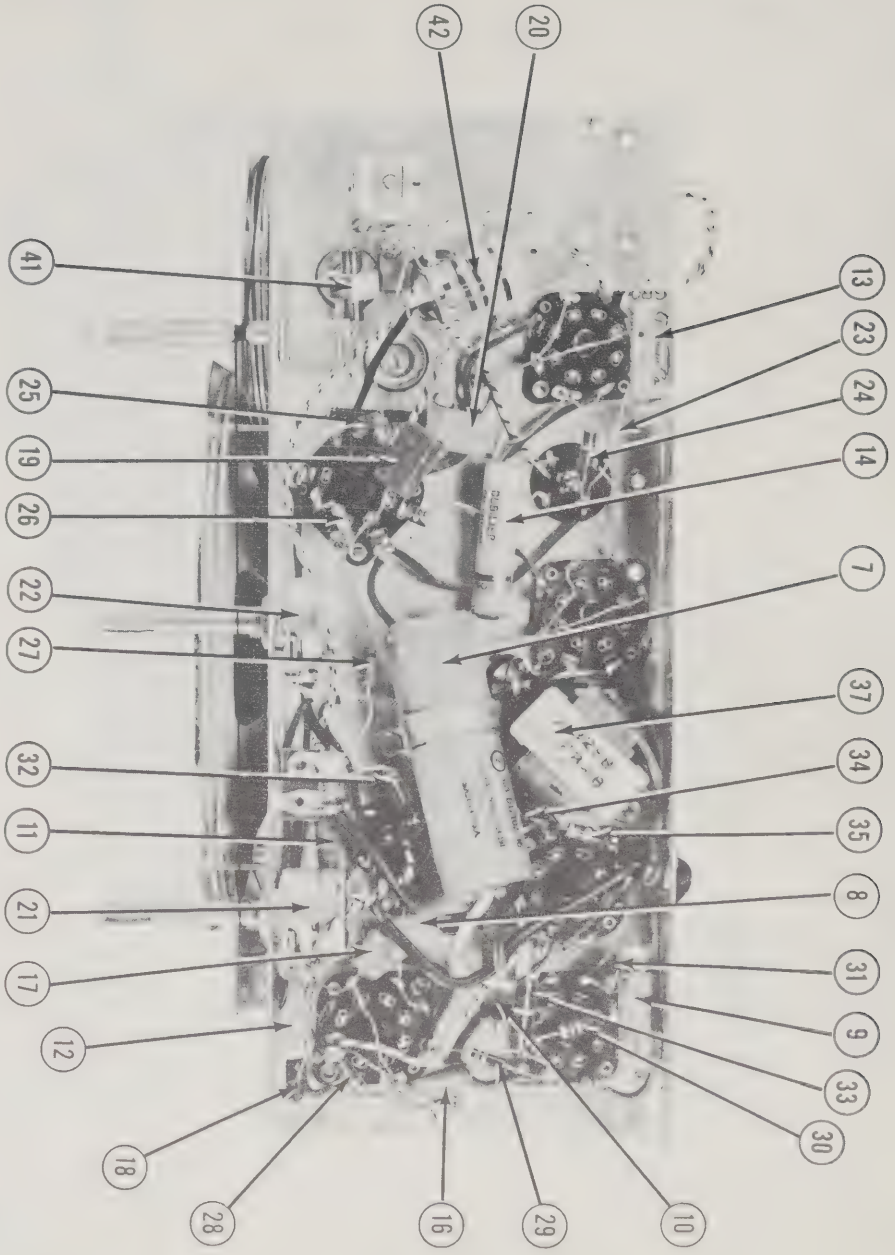
MISCELLANEOUS

ITEM No.	PART NAME	SENTINEL PART No.	NOTES
46	2 Gang Var. Cap.	24E8	(27-463MMF, 29-193MMF)
	Dial Scale	36E36	Glass
	Dial Pointer	35E23	
	Knob	37E27-11	For Walnut Cabinet
	"	37E27-15	For Ivory Cabinet
	Cabinet	7E46-1	Walnut Plastic
	"	7E46-2	Ivory Plastic

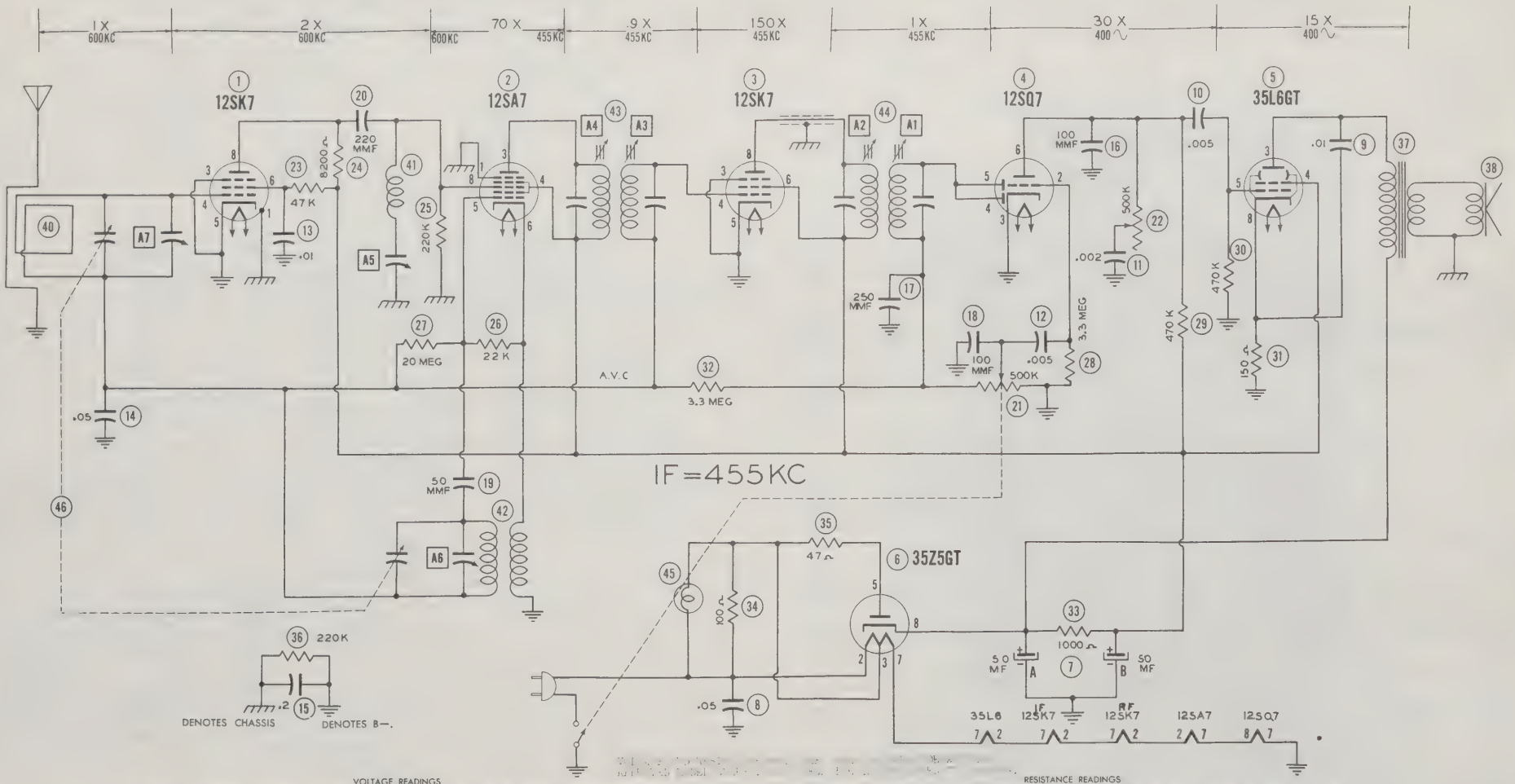


DATE 5/48-#489-21 SET #39-FOLDER #21

CHASSIS—BOTTOM VIEW



SENTINEL MODEL 313W



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	[illegible]	[illegible]V.	[illegible]Vac	V.	-.9VDC	0V.	50VDC	[illegible]Vac	[illegible]VDC
2	[illegible]	V.	26VAC	85VDC	85VDC	-13VDC§	0V.	13VAC	-.3VDC
3	[illegible]	V.	38VAC	0V.	-.8VDC	0V.	85VDC	50VAC	85VDC
4	[illegible]	V.	[illegible]Vac	V.	[illegible]VDC	[illegible]V.	[illegible]V.	V.	[illegible]Vac
5	35L6GT	0V.	50VAC	107VDC	85VDC	0V.	0V.	87VAC	5.3VDC
6	35Z5GT	0V.	117VAC	114VAC	0V.	112VAC	0V.	87VAC	115VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]MEG	[illegible]Ω	110Ω	[illegible]Ω	[illegible]Ω
2	[illegible]	[illegible]	6[illegible]	[illegible]	60kΩ	[illegible]Ω	[illegible]	1[illegible]Ω	[illegible]K
3	[illegible]	[illegible]	[illegible]	[illegible]	3.8 Meg.	[illegible]	[illegible]Ω	[illegible]Ω	[illegible]Ω
4	12SQ7	0Ω	3.3 Meg.	0Ω	500kΩ	500kΩ	[illegible]Ω	[illegible]	1[illegible]
5	35L6GT	0Ω	50Ω	60KΩ	60KΩ	470kΩ	INF.	[illegible]	[illegible]
6	35Z5GT	INF.	112Ω	110Ω	INF.	160Ω	INF.	[illegible]	[illegible]MΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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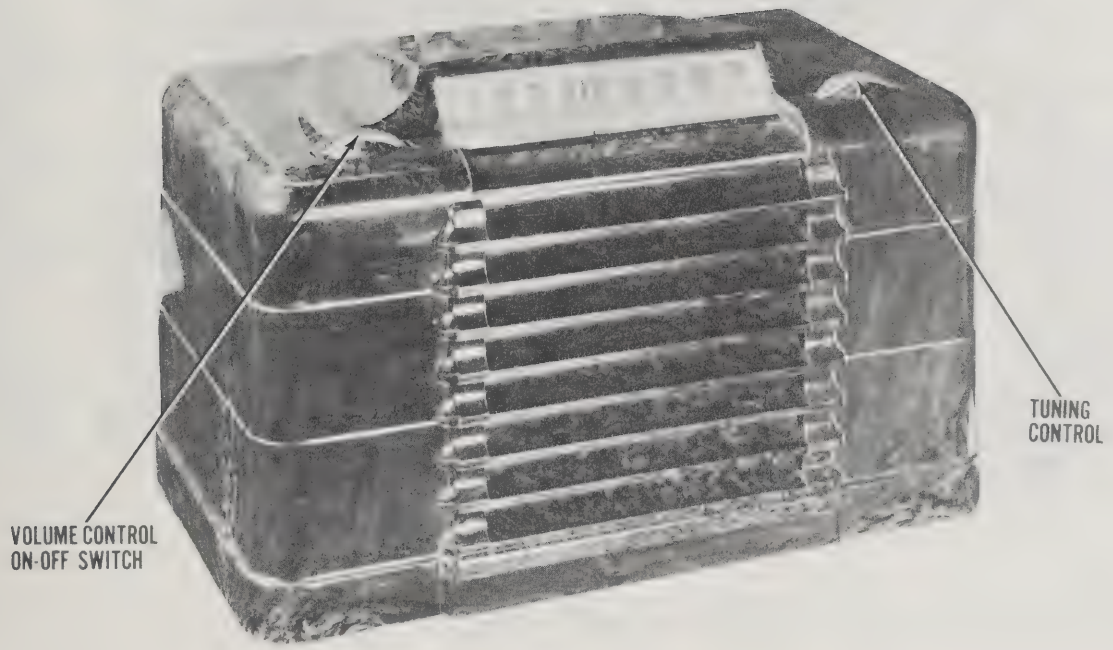
489-21

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

SETCHELL-CARLSON
MODEL 437



SETCHELL-CARLSON
MODEL 437

SETCHELL-CARLSON MODEL 437

TRADE NAME	Setchell-Carlson, Model 437
MANUFACTURER	Setchell-Carlson, Inc., 2233 University Ave., St. Paul, Minn.
TYPE SET	DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (SEVEN)	Types, 6SK7GT RF Amp., 6SA7GT Converter, 6SK7GT IF Amp., 6SQ7GT Det.-AVC-AF, 12SN7GT 2nd AF-Phase Inv., (2) 25L6GT Power Output.
POWER SUPPLY	32 Volts DC
TUNING RANGE—BROADCAST	535-1650KC RATING .94 Amp. @ 32 Volts DC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low freq. end of dial.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 8 of 12SA7. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output.
2	200MMFD	High side to ext. antenna clip. Low side to chassis.	1500KC	1500KC	"	A5	" " " "
3	200MMFD	"	1400KC	Tune for maximum output.	"	A6,A7	" " " "

HOWARD W. SAMS & CO., INC. **Indianapolis Indiana**

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DATE 5/48-#489-22 SET #39-FOLDER #2

PARTS LIST AND DESCRIPTIONS

SETCHELL-CARLSON
MODEL 43

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: SETCHELL-CARLSON PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	6SK7GT	6SK7GT	7N	
2	Converter	6SA7GT	6SA7GT	8AD	
3	IF Amp.	6SK7GT	6SK7GT	7N	
4	Det.-AVC-AF	6SQ7GT	6SQ7GT	7R	
5	2nd AF-Phase Inverter	12SN7GT	12SN7GT	9BS	
6	Power Output	25L6GT	25L6GT	7AC	
7	" "	25L6GT	25L6GT	7AC	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SETCHELL-CARLSON PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
8	50	150		PRS150/50	BR5015	M-50-150	UT-501	Filter
9	.5	200		484-.5	DT2P5	ST-2-5	TC-5	RF Bypass Pwr. Supply
10	.01	400		464-01	DT4S1	ST-4-01	TC-11	Output Plate Bypass
11	.01	400		464-01	DT4S1	ST-4-01	TC-11	" " "
12	.01	400		464-01	DT4S1	ST-4-01	TC-11	Audio Coupling
13	.01	400		464-01	DT4S1	ST-4-01	TC-11	" "
14	.004	500		664-004	DT6D4	ST-6-004	TC-24	" "
15	.01	400		464-01	DT4S1	ST-4-01	TC-11	" "
16	.1	200		484-.1	DT2P1	ST-2-1	TC-1	Decoupling Bypass
17	.05	200		464-05	DT2S5	ST-4-05	TC-15	AVC Filter
18	.05	200		464-05	DT2S5	ST-4-05	TC-15	" "
19	100	400		1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass
20	250	400		1468-00025	5W5T25	MO.5-325	1FM-325	Diode RF Filter-Cer.
21	100	400		1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Cap.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SETCHELL-CARLSON PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
22A	500Kω	2		D13-133#	M-60-Z#	Volume Control
B	Shaft			A	Not Req.	Attach to 22A per instructions
C	Switch			41	SW-A	" " " " "

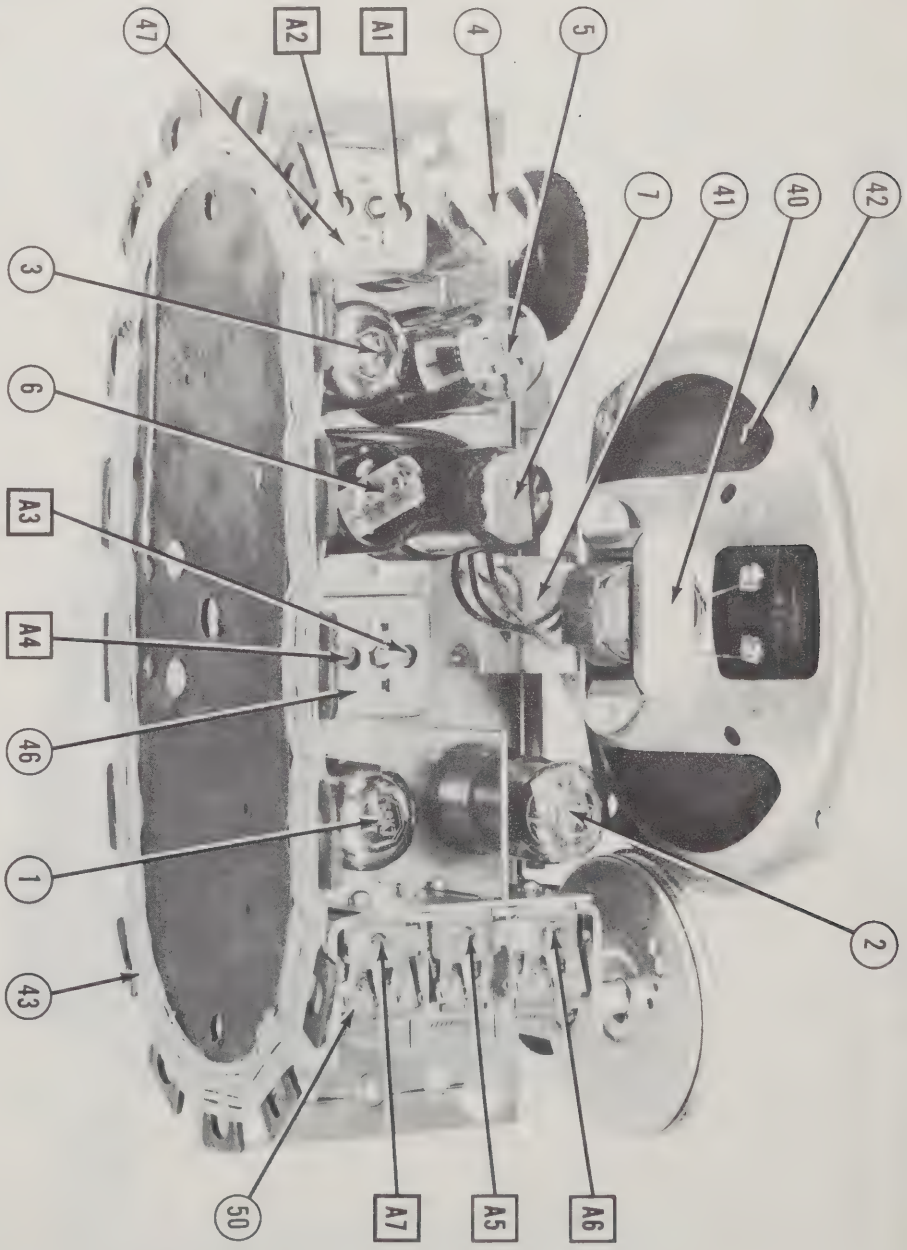
#Use original nut on bushing, also use ground lug on left hand terminal.

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SETCHELL-CARLSON PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
23	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
24	47K	½		BTS-47K	Yl.-Vio.-Or. Osc. Grid
25	47Ω	½		BTS-47Ω	Grn.-Blk.-Br. Decoupling
26	4.7 Meg.	½		BTS-4.7 Meg.	Grn.-Br.-Grn. AVC Network
27	100K	½		BTS-100K	Br.-Blk.-Yl. Diode Load
28	220K	½		BTS-220K	Red-Blk.-Yl. 1st AF Plate Load
29	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. 2nd AF Grid
30	100K	½		BTS-100K	Br.-Blk.-Yl. 2nd AF Plate Load
31	47K	½		BTS-47K	Yl.-Vio.-Or. Phase Inverter Grid
32	100K	½		BTS-100K	Br.-Blk.-Yl. Phase Inverter Plate
33	47Ω	½		BTS-47Ω	Grn.-Blk.-Blk. Phase Inverter Cathode
34	47K	½		BTS-47K	Grn.-Br.-Yl. Output Grid
35	47K	½		BTS-47K	Grn.-Br.-Yl. " "
36	1	1		BW-½-150	Br.-Grn.-Br. Output Cathode
37	150	½		AB-50	Grn.-Blk.-Blk. Pilot Light Shunt-See Note1
38	47Ω	½		BTS-47Ω	Grn.-Blk.-Br. Decoupling
39	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. 1st AF Grid

Note 1-Some sets use two 100 ohm resistors in parallel.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		SETCHELL-CARLSON PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
40	5000Ω CT	3.3Ω	200Ω CT	.3Ω	0-437		T22S47#	A-2900	#Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			SETCHELL-CARLSON PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.		ST-10c*		
41	PM	3.3Ω	SP-1	Mod. P6-X	6A15*	*Fabricate new mounting bracket.
	CONE DIA.	VC DIA.				
42	6"	1/2"				

R F COILS

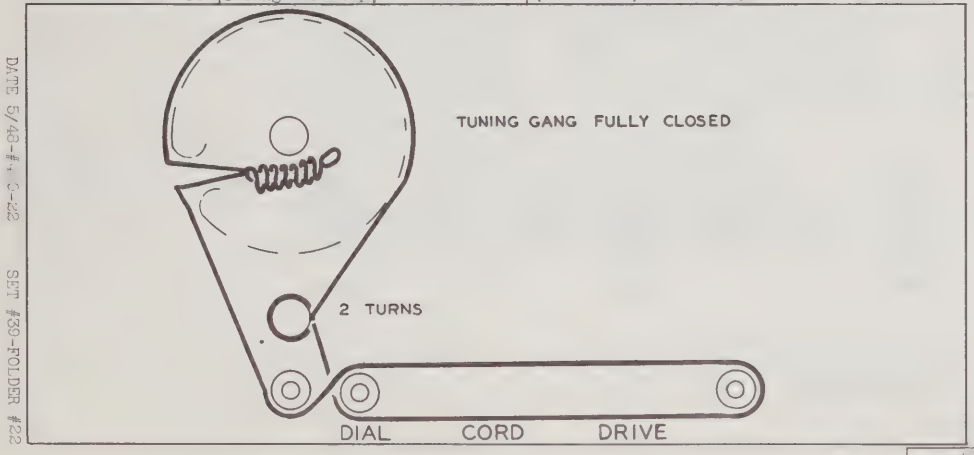
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	SETCHELL-CARLSON PART No.	MEISSNER PART No.	
43	Loop Ant.		3Ω	427-19		
44	RF Coil	102Ω	4.7Ω			
45	Osc. Coil		4.6Ω		14-1060	
46	Input IF	18Ω	18Ω	621-305	16-6658	
47	Output IF	18Ω	18Ω	622-305	16-6660	

DIAL LIGHT

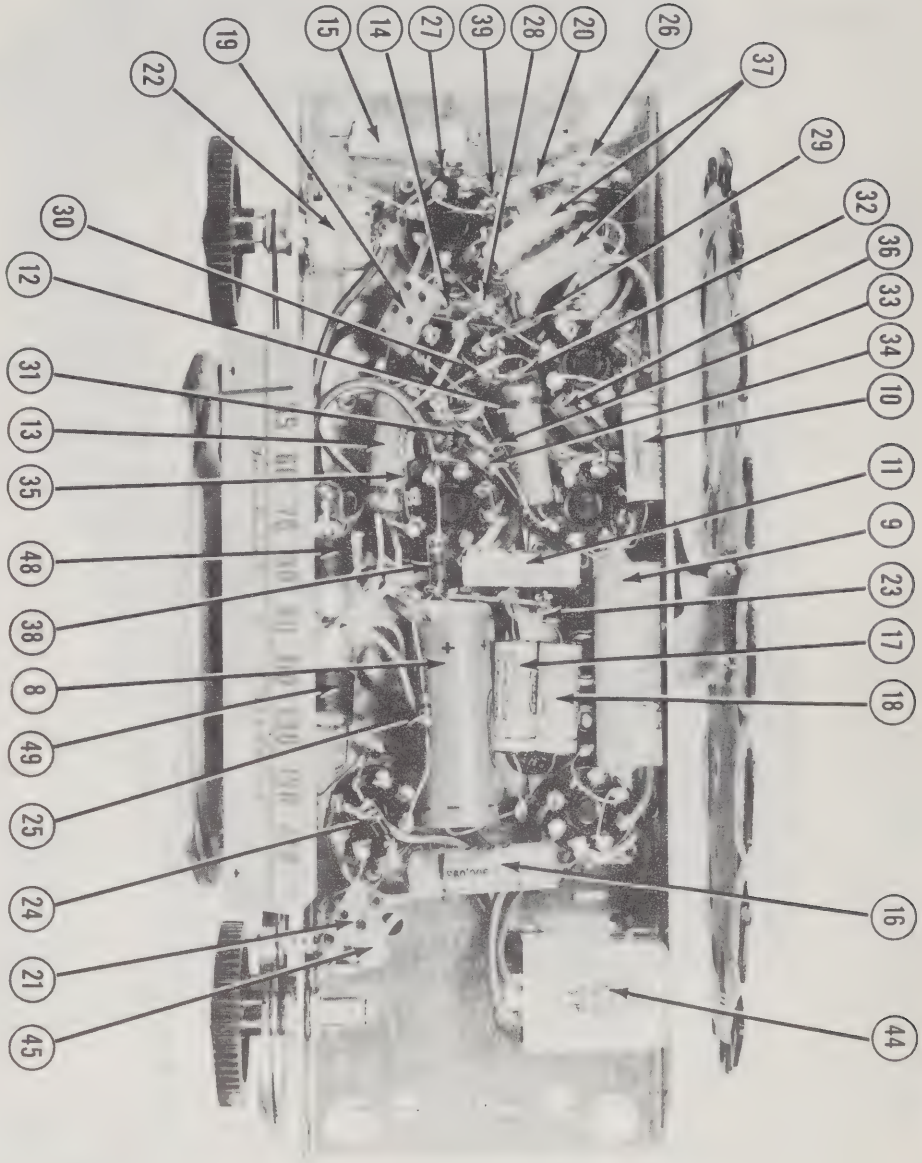
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					SETCHELL-CARLSON PART No.		
48	Bayonet	6-8	0.25	Blue			Type 44
49	"	6-8	0.25	"			" "

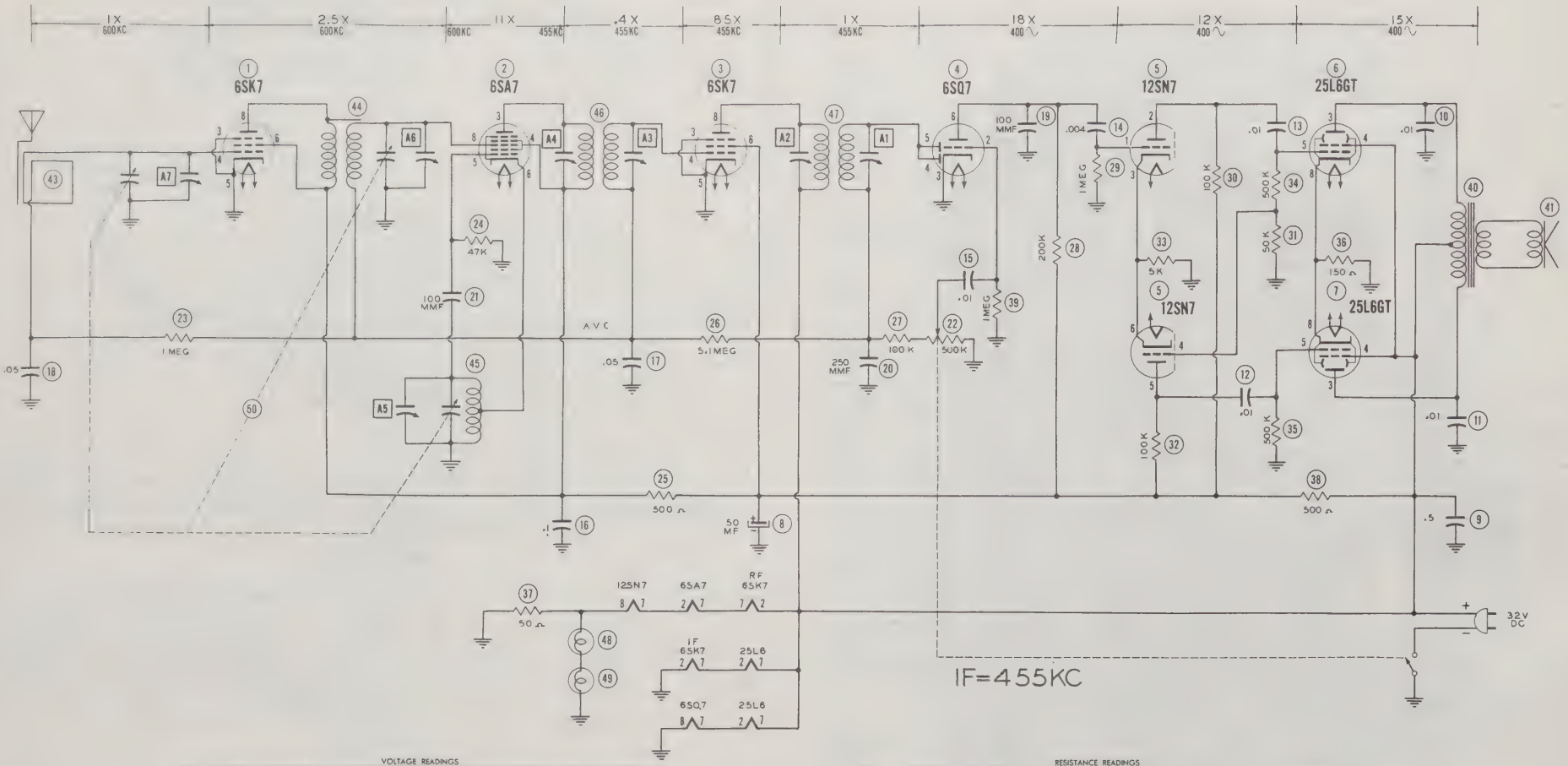
MISCELLANEOUS

ITEM No.	PART NAME	SETCHELL-CARLSON PART No.	NOTES
50	3 Gang Var. Cap	470805	(27-470MMF, 30-195MMF, 27-470MMF)



CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SK7GT	0V.	32VDC	0V.	-.7VDC	0V.	[illegible]	[illegible]	[illegible]
2	6SA7GT	0V.	19VDC	28VDC	28VDC	-4VDC§	0V.	28VDC	-.7VDC
3	6SK7GT	0V.	0V.	0V.	-.7VDC	0V.	30VDC	6VDC	32VDC
4	6SQ7GT	0V.	-.7VDC	0V.	-.4VDC	-.4VDC	22VDC	6VDC	0V.
5	12SN7GT	0V.	17VDC	1.4VDC	0V.	17VDC	1.4VDC	19VDC	8VDC
6	25L6GT	0V.	6VDC	32VDC	32VDC	0V.	0V.	32VDC	2.6VDC
7	25L6GT	0V.	6VDC	32VDC	32VDC	0V.	0V.	32VDC	2.6VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SK7GT	0Ω	0.5Ω	1Ω	1 Meg.	0Ω	1KΩ	1Ω	1.1KΩ
2	6SA7GT	0Ω	0.5Ω	1KΩ	1KΩ	47KΩ	2Ω	0.5Ω	0.1 MegΩ
3	6SK7GT	0Ω	0Ω	0Ω	1 Meg.	0Ω	0.1KΩ	4Ω	24Ω
4	6SQ7GT	0Ω	1 Meg.	0Ω	600KΩ	600KΩ	2Ω	2Ω	0Ω
5	12SN7GT	1 Meg.	100KΩ	5KΩ	50KΩ	100KΩ	1KΩ	0.5Ω	4Ω
6	25L6GT	INF.	4Ω	110Ω	6.5Ω	500KΩ	INF.	0.5Ω	1Ω
7	25L6GT	INF.	2.5Ω	100Ω	6.5Ω	550KΩ	INF.	0.5Ω	1Ω

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by connecting negative (-) 3 volts to the AVC line.

1 - DC Voltage measurements at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 32 volts DC for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - Volume control at maximum, no signal applied for voltage measurements.

SIGNAL MODEL 341-A
BATTERY-LINE OPERATED

SIGNAL MODEL 341-A
BATTERY-LINE OPERATED

SIGNAL MODEL 341-A

TRADE NAME	Signal, Model 341-A
MANUFACTURER	Signal Electronic Inc., 114 E. 16th St., New York 3, N.Y.
TYPE SET	Three Power Operated Portable Superheterodyne Receiver with Loop Antenna
TUBES (FOUR)	Types, 1R5 Converter, 1T4 IF Amp., 1S5 Det.-AVC-AF, 3S4 Power Output.
POWER SUPPLY RATING	110-120 Volts AC-DC or 4.5 Volts "A" Supply and 67.5 Volts "B" Supply .20 Amp. @ 117 Volts AC or 110MA @ 4.5 Volts DC and 17MA @ 67.5 Volts DC
TUNING RANGE—BROADCAST	540-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use battery power when available. If AC power is used, use an isolation transformer when available. If not, connect a .1 MFD capacitor in series with low side of the signal generator and B-. Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to rear stator of tuning cap. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If AC power is used without an isolation transformer reduce dummy ant. to 200 MMF to reduce hum modulation.
2		Loop	1600KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1400KC	Tune for maximum output.	"	A6	Adjust for maximum output.

HOWARD W. SAMS & CO., INC. **Indianapolis Indiana**

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DATE 5/48-#489-23 SET #39-FOLDER #23

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: SIGNAL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	1R5	1R5	7AT	
2	IF Amp.	1T4	1T4	6AR	
3	Det.-AVC-AF	1S5	1S5	6AU	
4	Power Output	3S4	3S4	7BA	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SIGNAL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
5A	50	150	230005	PR8-A503010	EDL5315	DSB-5030-150	TA-530	Filter-Yl.
B	30	150						" -Red
C	200	15			BRH1525	M-250-15	UHC-215	Filament Bypass-Blue
6	.01	200	200001	484-01	DT2S1	ST-6-01	TC-11	Line Filter
7	.005	400	190004	484-005	DT6D5	ST-6-005	TC-25	Output Plate Bypass
8	.005	400	190004	484-005	DT6D5	ST-6-005	TC-25	Audio Coupling
9	.01	200	200001	484-01	DT2S1	ST-4-01	TC-11	AF Screen Bypass
10	.005	200	190004	484-005	DT6D5	ST-6-005	TC-25	Audio Coupling
11	.01	200	200001	484-01	DT2S1	ST-4-01	TC-11	AVC Filter
12	.01	200	200001	484-01	DT2S1	ST-4-01	TC-11	" "
13	.01	200	200001	484-01	DT2S1	ST-4-01	TC-11	Screen Decoup.
14	.05	200	190001	484-05	DT2S5	ST-4-05	TC-15	Filament Bypass
15	.01	200	200001	484-01	DT2S1	ST-4-01	TC-11	" "
16	150		210001	1468-00015	5W5T15	MO.5-315	1FM-315	Bias Filter-Cer.
17	150		210001	1468-00015	5W5T15	MO.5-315	1FM-315	AF Plate Bypass-Cer.
18	150		210001	1468-00015	5W5T15	MO.5-315	1FM-315	Diode RF Filter-Cer.
19	50		210002	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.-Cer.

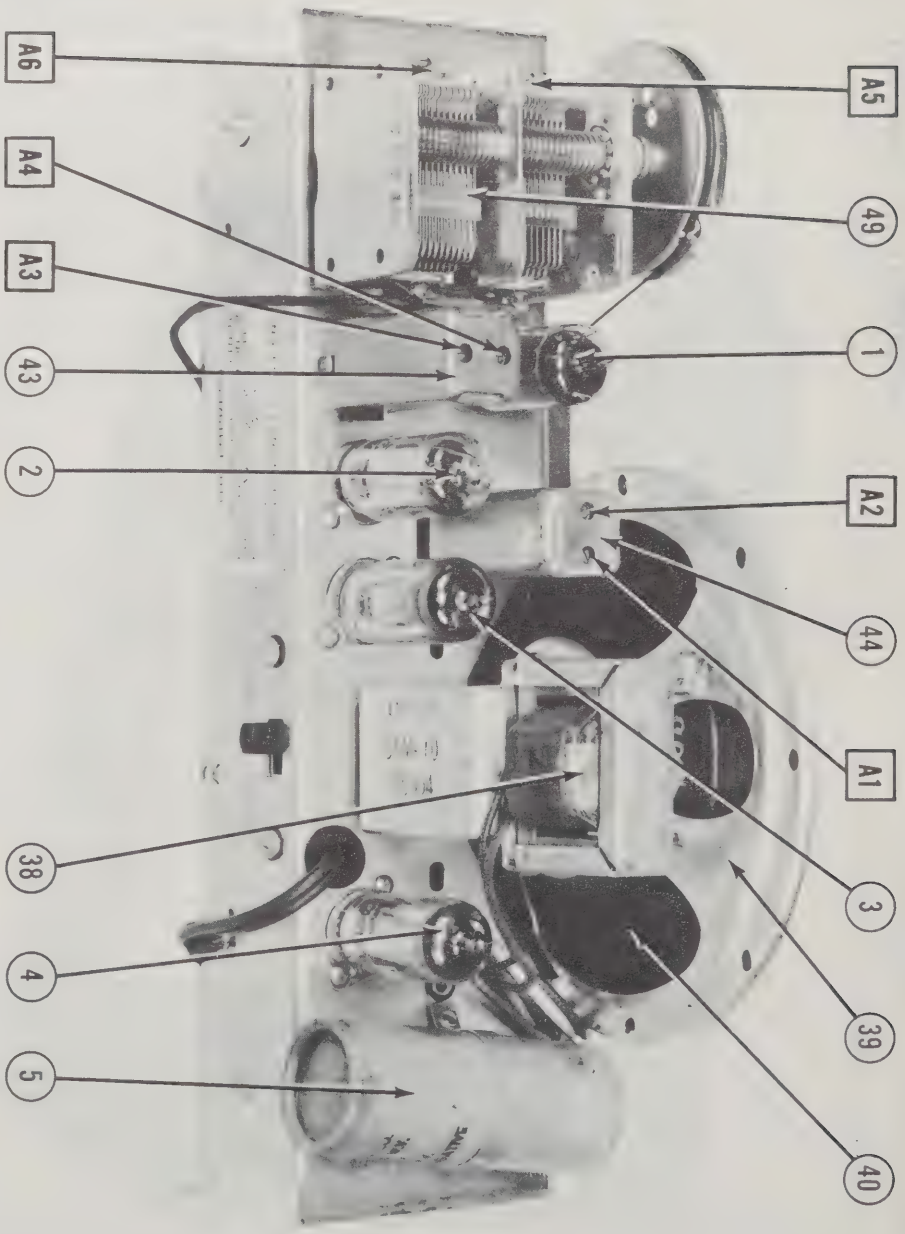
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SIGNAL PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
20A	500KΩ	½	300001	D13-133	M-60-Z	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 20A per instructions
C	Switch		" "	42	SW-A2	" " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SIGNAL PART No.	IRC PART No.	IDENTIFICATION CODES
21	91KΩ	½		BTS-100K	White-Br.-Or. Oscillator Grid
22	1.5 Meg.	½	272155	BTS-1.5 Meg.	Br.-Grn.-Grn. Bias Network
23	1 Meg.	½	272105	BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
24	5100Ω	½		BTS-4700	Grn.-Br.-Red Screen Dropping
25	10 Meg.	½	272106	BTS-10 Meg.	Br.-Blk.-Blue AF Grid
26	3.3 Meg.	½	272335	BTS-3.3 Meg.	Or.-Or.-Grn. AF Screen Dropping
27	1.1 Meg.	½		BTS-1 Meg.	Br.-Br.-Grn. AF Plate Load
28	2.2 Meg.	½	272225	BTS-2.2 Meg.	Red-Red-Grn. Output Grid
29	220KΩ	½	272224	BTS-220K	Red-Red-Yl. Bias Network
30	220Ω	½	272221	BW-½-220	Red-Red-Br. Filament String
31	470Ω	½	272471	BTS-470	Yl.-Vi.-Br. " "
32	1000Ω	½	272102	BTS-1000	Br.-Blk.-Red " "
33	680Ω	½	272681	BTS-680	Blue-Gray-Br. " "
34	22Ω	½		BW-½-22	Red-Yl.-Blk. Filament Dropping
35	250Ω	10	306001	A5-250	" "
36	1500Ω	1	282252	BTA-1500	Br.-Grn.-Red Filter
37	30Ω	1		BW-1-27	Or.-Blk.-Blk. Surge Limiter

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		SIGNAL PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
38	5400Ω	3.2Ω	385Ω	.9Ω	Part of 185004	A-3877*	T22S46*	A-2930*	*Bend mounting tabs down, file out slots and mount on original bracket.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			SIGNAL PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.		ST-107		
39	PM	3.2Ω	185004	Mod. P5-V	5A1	
	CONE DIA.	VC DIA.				
40	4-3/4"	1/2"				

R F COILS

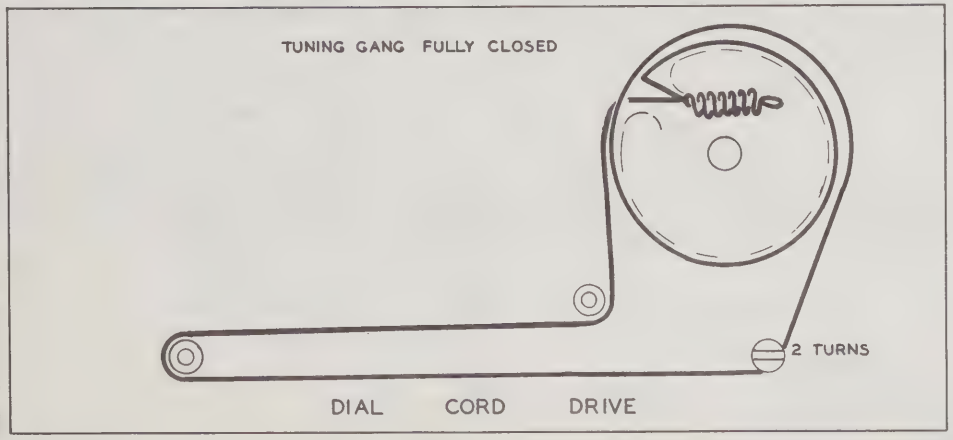
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	SIGNAL PART No.	MEISSNER PART No.	
41	Loop Ant.		1.8Ω	247006		
42	Osc. Coil	1.5Ω	5.2Ω	248001	14-1060	
43	Input IF	22Ω	22Ω	305007	16-6668	
44	Output IF	15Ω	20Ω	305011	16-6669	

BATTERIES

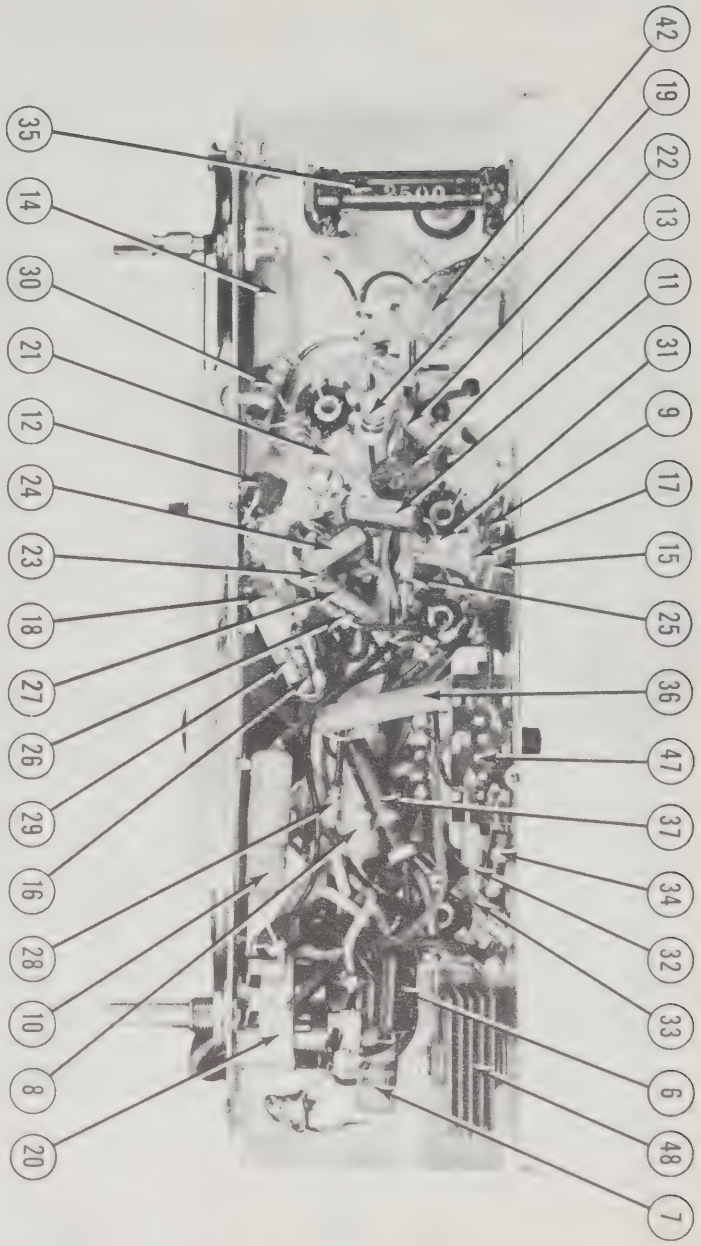
ITEM No.	VOLTAGE	SIGNAL PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
45	4.5V "A"	372003	#746			G-3			
46	67.5V "B"	372002		#467			XX45		

MISCELLANEOUS

ITEM No.	PART NAME	SIGNAL PART No.	NOTES
47	Switch	255003	AC-DC-Batt.
48	Rectifier	370001	Selenium
49	2 Gang Var. Cap.	235001	(31-470MMF, 40-205MMF)
	Dial Window	340011	
	Dial Pointer	346001	
	Knob	359001	

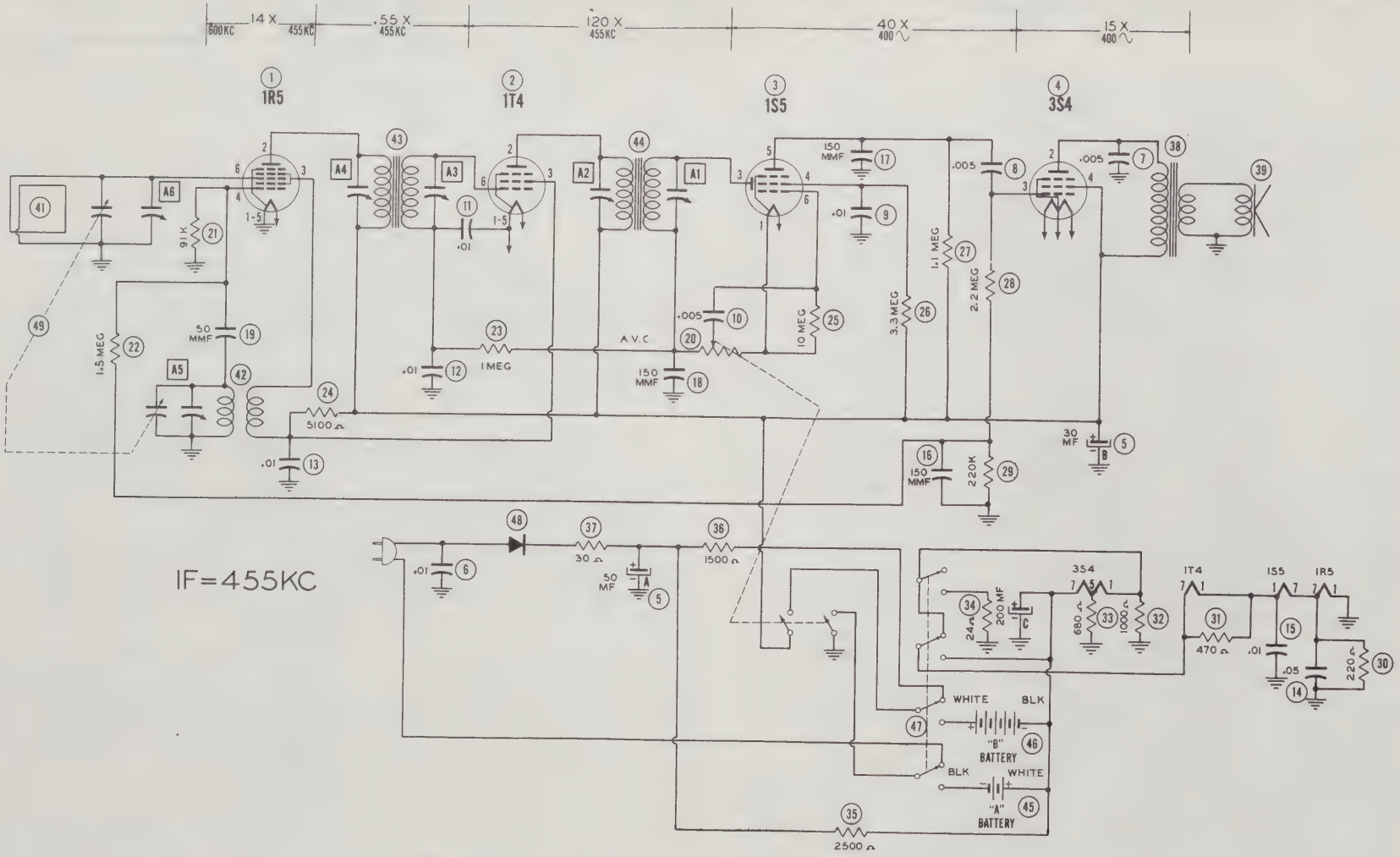


CHASSIS—BOTTOM VIEW



DATE 5/49-#489-23 SET #39-FOLDER 23

SIGNAL MODEL 241-A



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	[illegible]	[illegible]	[illegible]	[illegible]	0V.	0V.	1.4VDC
2	1T4	3VDC	[illegible]	70VDC	-1.8VDC	3VDC	.2VDC	4.4VDC
3	1S5	3VDC	0V.	1VDC	1.[illegible]VDC	8.8VDC	0V.	1.4VDC
4	3S4	4.4VDC	90VDC	-.3VDC	95VDC	5.8VDC	[illegible]	1.4VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

VOLTAGE AND RESISTANCE READINGS TAKEN IN AC-DC POSITION.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	*	4KΩ	9KΩ	100KΩ	*	1.8Ω	*
2	1T4	*	4KΩ	9KΩ	200KΩ	*	1.5 Meg.	*
3	1S5	*	INF.	500KΩ	3.3 Meg.	1 Meg.	10 Meg.	*
4	3S4	*	4KΩ	2.4 Meg.	4KΩ	*	4KΩ	*

*DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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489-23

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by shorting AVC to chassis.

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - Volume control at maximum, no signal applied for voltage measurements.

PHOTOFACT* Folder

*TRADE MARK

STEWART WARNER MODELS 51T46 (Code #9024-B), 51T56 (Code #9024-C)

STEWART WARNER MODELS 51T46 (Code #9024-B), 51T56 (Code #9024-C)

STEWART-WARNER MODEL 51T56

TRADE NAME	Stewart-Warner, Model 51T46 (Code #9024-B), 51T56 (Code #9024-C)
MANUFACTURER	Stewart-Warner Corp., 1826 Diversey Pkwy., Chicago, Ill.
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 12SA7 Converter, 12SK7 IF Amp., 12SQ7 Det.-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	110-120 Volts AC-DC
TUNING RANGE—BROADCAST	540-1600KC
RATING	.25 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

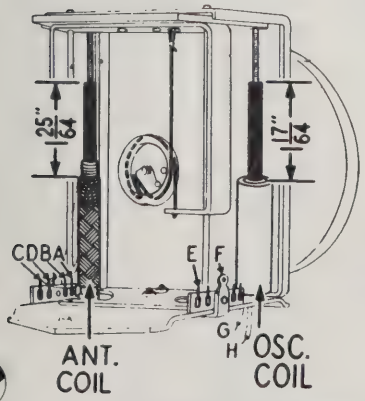
Prior to removing chassis from cabinet turn tuning control fully clockwise and set pointer to 1600KC calibration mark. Then turn tuning control until pointer is at 1400KC. Remove chassis from cabinet and mark position of pointer on dial backplate.

Turn tuning control fully clockwise and position coil slugs per sketch.

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading.

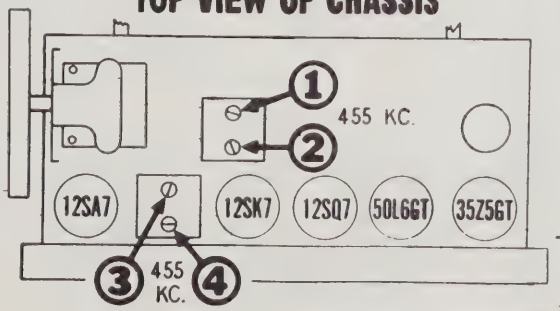
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	200MMFD	High side to Pin 8 of 12SA7. Low side to B-.	455KC	Tuning control fully clockwise.	Across voice coil.	A1,A2,	Adjust for maximum output.
2	200MMFD	"	"	"	"	A3,A4	Adjust for maximum output. Repeat Steps 1 & 2 until no further improvement can be made.
3	200MMFD	High side to ext. antenna clip. Low side to B-.	1600KC	"	"	A5	Adjust for maximum output.
4	200MMFD	"	"	Tune for maximum output.	"	A6	" " " "
5	200MMFD	"	1400KC	1400KC calibration mark	"	A7,A8	Adjust for maximum output. Repeat Steps 3 & 4.
6	200MMFD	"	"	Tune for maximum output.	"	A8	Adjust for maximum output. Apply speaker cement to each slug stem.



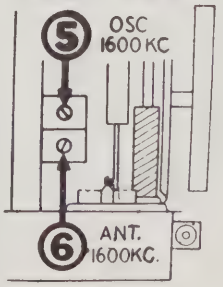
SLUG TUNER ASSEMBLY
(Drive Parts)

117057 Cord (8")
114955 Clip on cord
504012 Spring

TOP VIEW OF CHASSIS



FRONT VIEW



TRIMMER LOCATIONS

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PARTS LIST AND DESCRIPTIONS

STEWART-WARNER MODELS [illegible]

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: STEWART-WARNER PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12SA7	12SA7	8R	
2	IF Amp.	12SK7	12SK7	9N	
3	Det.-AVC-AF	12SQ7	12SQ7	8Q	
4	Power Output	50L6GT	50L6GT	7AC	
5	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: STEWART-WAR. PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	40	150	500256	AF88D	UP4215	DY-4020-150	EL-24	▲ Filter
6	20	150						"
7	.05	400	502157	484-05	DT4S5	ST-4-05	TC-15	Rectifier Bypass
8	.02	400	502152	484-02	DT4S2	ST-4-02	TC-12	Output Plate Bypass
9	.004	600	502156	684-004	DT6D4	ST-6-004	TC-24	Audio Coupling
10	.0008	400	502470	1468-00075	1W5T8	MW.5-38	1FM-37	Audio Plate Bypass
11	.004	600	502156	684-004	DT6D4	ST-6-004	TC-24	Audio Coupling
12	.05	200	502153	484-05	DT4D5	ST-4-05	TC-15	AVC Filter
13	.2	400	502158	484-.2	DT4P2	ST-4-.2	TC-2	Line Isolation-See Note
14	220	500	502882	1468-00025	5W5T25	MO.5-325	1FM-325	Diode RF Filter
15	100	500	502931	1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Cap.

Note-Wrap 3 turns #22 insulated wire closely wound on replacement as per original.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: STEWART-WARNER PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
16	1 Meg.	½	502128			Volume Control & Sw.

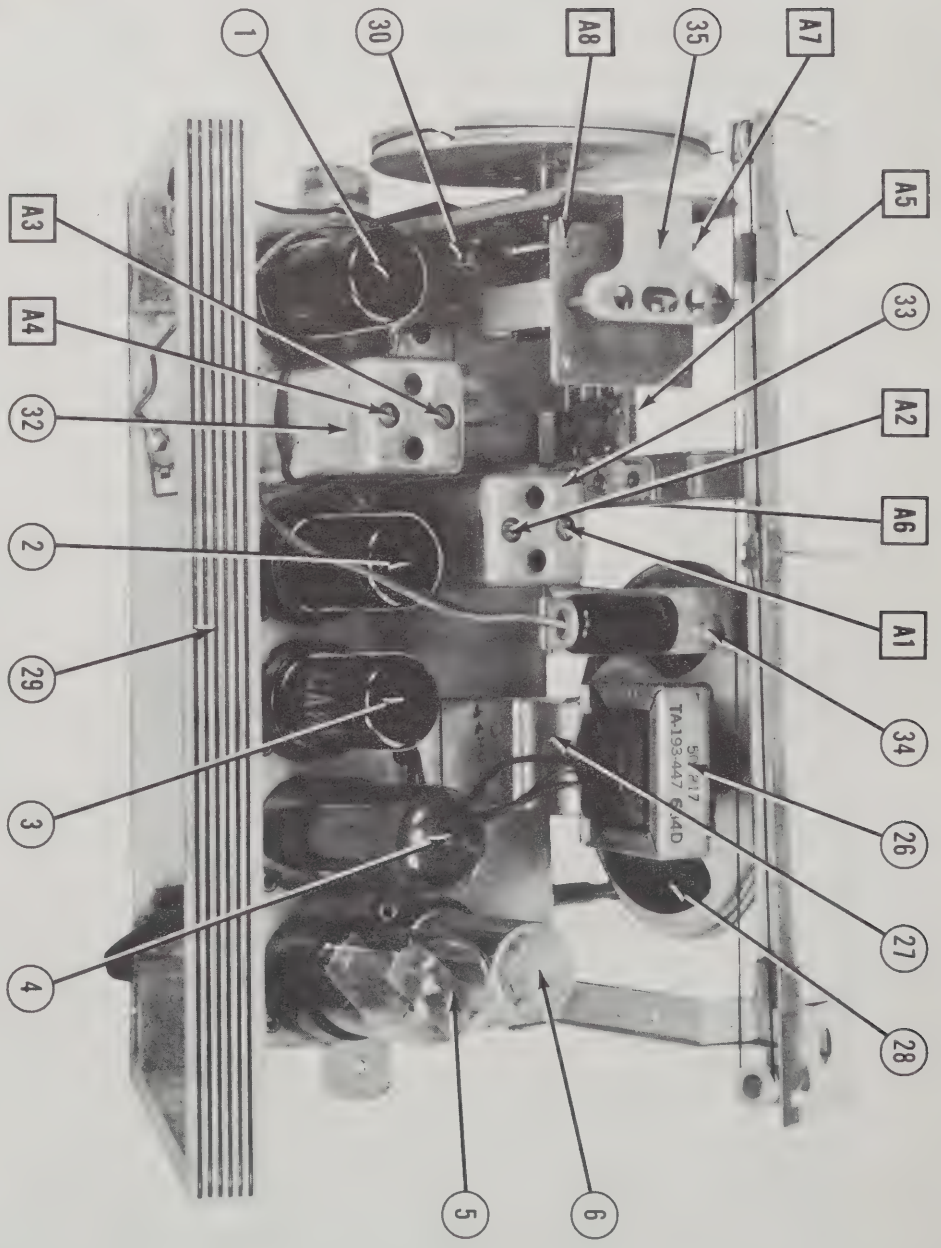
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: STEWART-WARNER PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
17	22KΩ	½	502130	BTS-22K	Red-Red-Or. Oscillator Grid
18	2.2 Meg.	½	502135	BTS-2.2 Meg	Red-Red-Grn. AVC Network
19	47Ω	½	502264	BW-½-47	Yl.-Vi.-Blk. IF Cathode
20	10 Meg.	½	502136	BTS-10 Meg.	Br.-Blk.-Blue AF Grid
21	470KΩ	½	502134	BTS-470K	Yl.-Vi.-Yl. AF Plate Load
22	470KΩ	½	502134	BTS-470K	Yl.-Vi.-Yl. Output Grid
23	150Ω	1	502932	BW-1-150	Br.-Grn.-Br. Output Cathode
24	1500Ω	1	502933	BTA-1500	Br.-Grn.-Red Filter
25	33Ω	2	502574	BTS-2-33	Or.-Or.-Blk. Rectifier Ballast

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: STEWART-WARNER PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: THORDAR'N PART No.	REPLACEMENT DATA: MERIT PART No.	INSTALLATION NOTES
26	2200Ω	2.5Ω	170Ω tapped @ 9Ω	.6Ω	502817	A-3576†		A-2028	†Add extra filter to reduce hum level. Bend mounting tabs down, file out slots and mount on original bracket.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA STEWART-WARNER PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.		ST-113*		*Fabricate new mounting bracket.
27	PM	2.8Ω	502816	Mod. P4-X	4A07*	
	CONE DIA.	VC DIA.				
28	4"	1/2"				

R F COILS

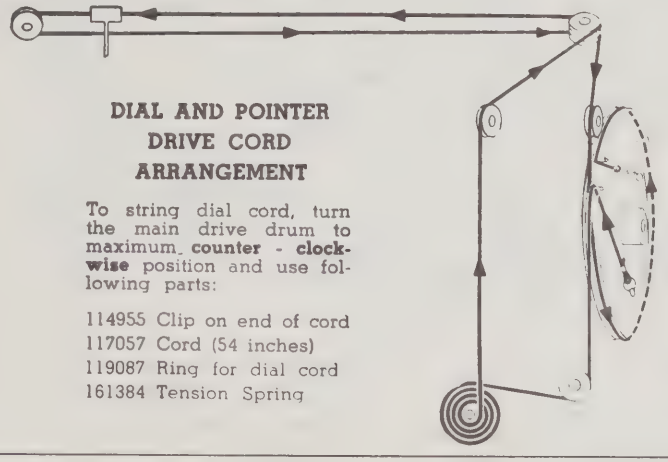
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA STEWART-WARNER PART No.	REPLACEMENT DATA MEISSNER PART No.	
29	Loop Ant.		.1Ω	504348		
30	Ant. Coil	1Ω	6.5Ω	504335		Items 30 & 31 are slug tuned and ganged together.
31	Osc. Coil	.2Ω	5Ω	504335		
32	Input IF	23Ω	23.5Ω	502926	16-6666	
33	Output IF	26Ω	26Ω	502927	16-6667	

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA STEWART-WARNER PART No.		INSTALLATION NOTES
34	Bayonet	6-8	0.15	Brown	118921		Type 47

MISCELLANEOUS

ITEM No.	PART NAME	STEWART-WARNER PART No.	NOTES
35	Tuning Assby.	504335	
A5, A6	Trimmer Strip	504330	(Osc. Adj. (Ant. Adj.
	Cabinet	500383	Ivory (Model 51T46)
	Dial Scale	504347	Glass (Model 51T46)
	" "	504356	" (Model 51T56)
	Knob	502504	Ivory
	Pointer	502367	

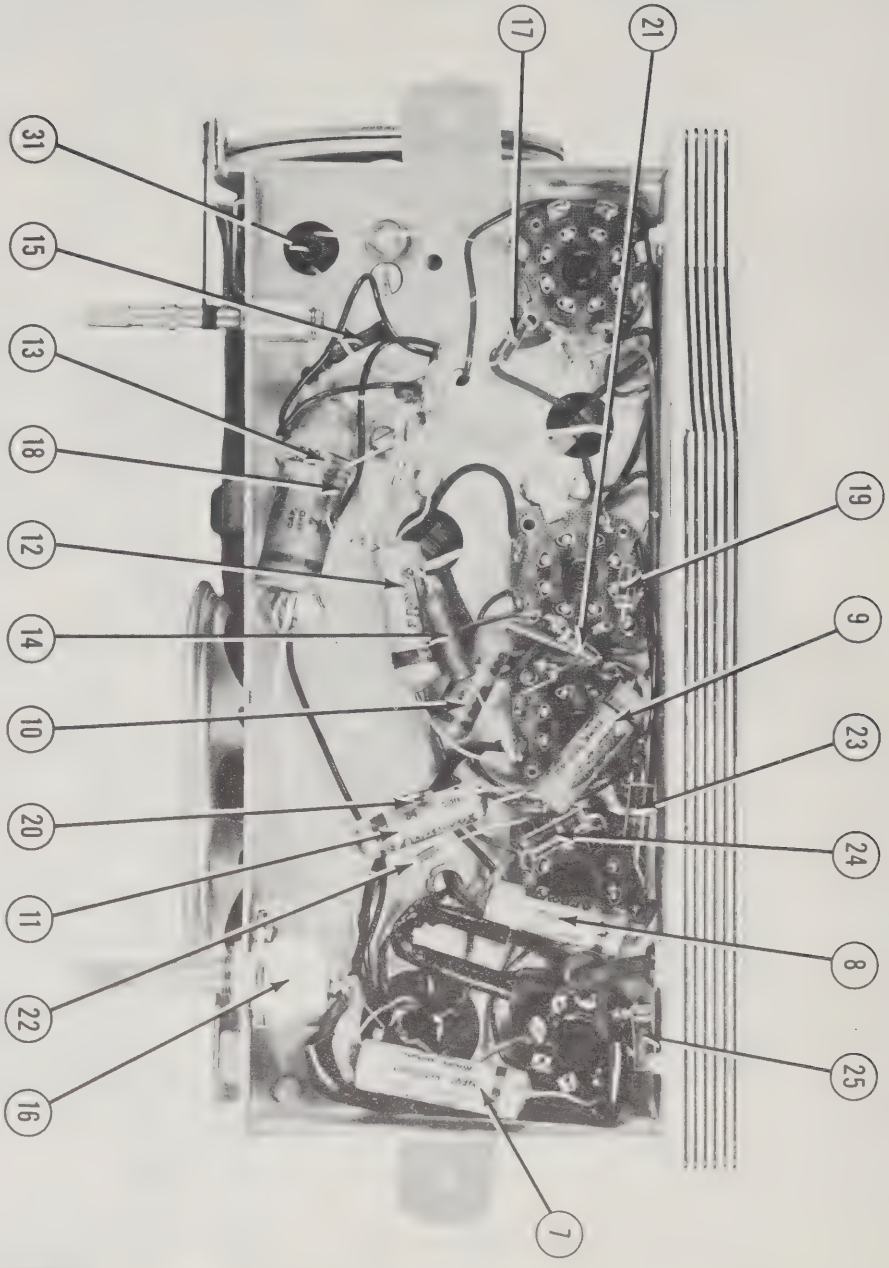


DIAL AND POINTER DRIVE CORD ARRANGEMENT

To string dial cord, turn the main drive drum to maximum **counter - clockwise** position and use following parts:

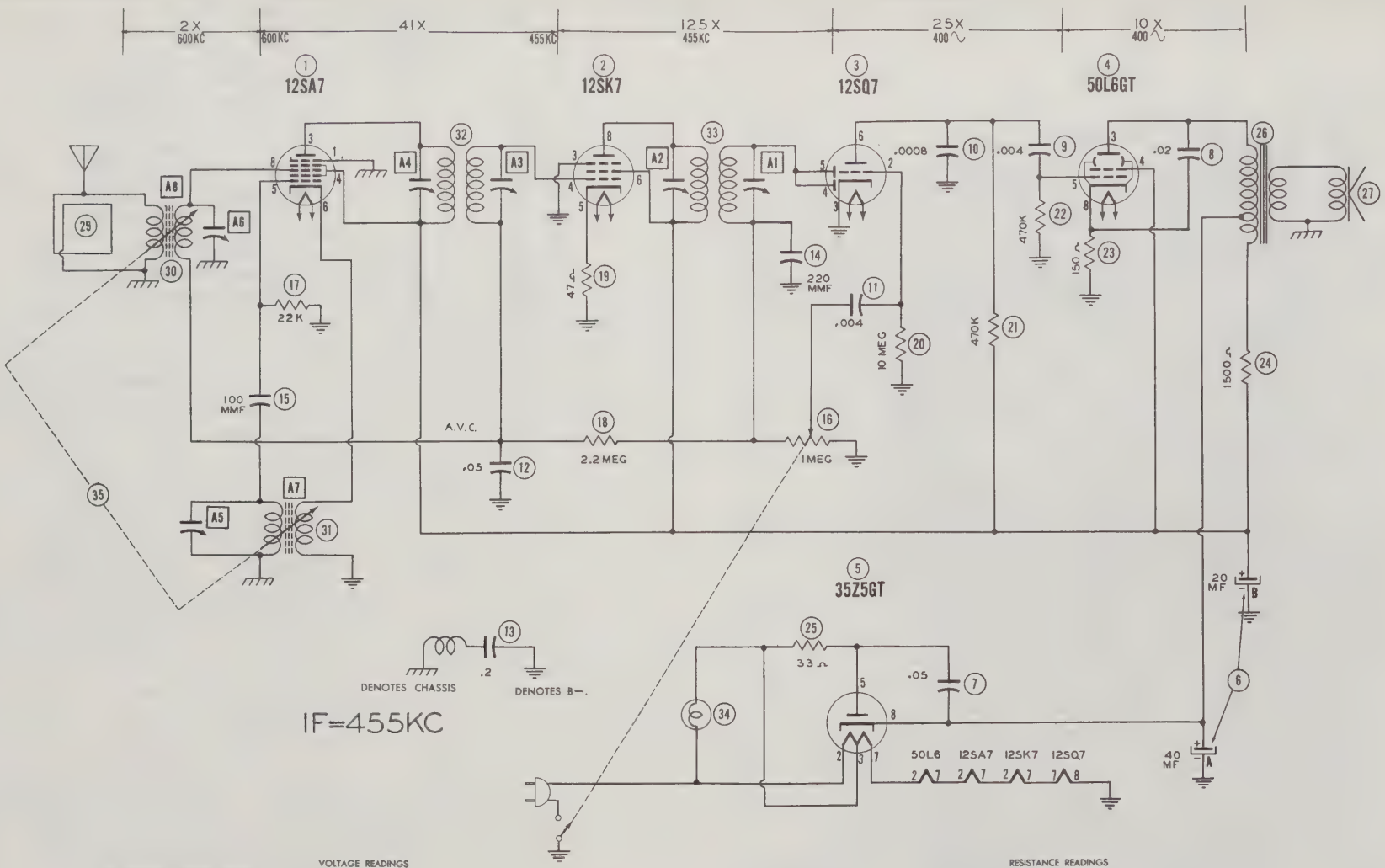
114955 Clip on end of cord
117057 Cord (54 inches)
119087 Ring for dial cord
161384 Tension Spring

CHASSIS—BOTTOM VIEW



DATE 5/43 #40-324 SET #39-FOLDER #24

STEWART-WARNER MODELS 51T46, 51T56



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	0V.	38VAC	80VDC	80VDC	-6VDC§	0V.	26VAC	0V.
2	12SK7	0V.	26VAC	0V.	0V.	.5VDC	80VDC	13VAC	80VDC
3	12SQ7	0V.	-.3VDC	0V.	-.4VDC	-.4VDC	50VDC	13VAC	0V.
4	50L6GT	0V.	86VAC	107VDC	80VDC	0V.	115VDC	33VAC	5.5VDC
5	35Z5GT	0V.	117VAC	114VAC	0V.	110VAC	0V.	86VAC	115VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	INF.	35Ω	65KΩ	65KΩ	22KΩ	.2Ω	24Ω	3.2 Meg.
2	12SK7	INF.	24Ω	0Ω	3.2 Meg.	47Ω	65KΩ	13Ω	65KΩ
3	12SQ7	INF.	10 Meg.	0Ω	1 Meg.	1 Meg.	530KΩ	13Ω	0Ω
4	50L6GT	INF.	87Ω	65KΩ	65KΩ	470KΩ	65KΩ	38Ω	150Ω
5	35Z5GT	INF.	112Ω	110Ω	INF.	140Ω	INF.	87Ω	65KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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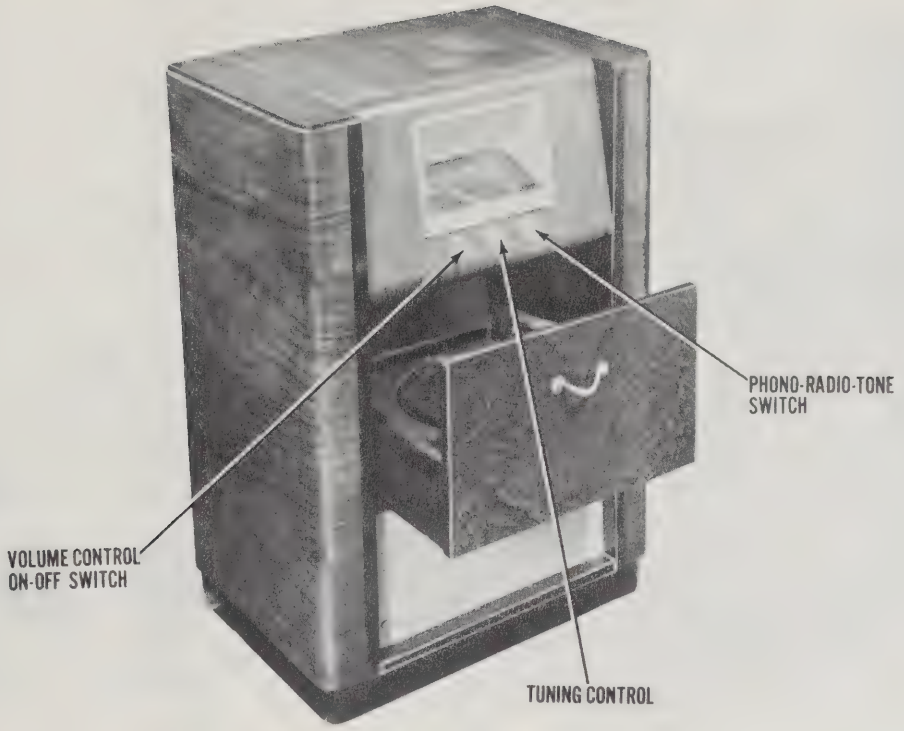
The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

STEWART-WARNER MODELS
A61CR1, A61CR2, A61CR3, A61CR4



STEWART-WARNER MODEL A61CR3

TRADE NAME	Stewart-Warner, Models A61CR1 (Code 9034-C), A61CR2 (Code 9034-D), A61CR3 (Code 9034-E), A61CR4 (Code 9034-F)
MANUFACTURER	Stewart-Warner Corp., 1826 Diversey Pkwy., Chicago, Ill.
TYPE SET	AC Operated Combination Phono-Radio Superheterodyne Receiver with Loop Antenna
TUBES (SIX)	Types, 6J5 Oscillator, 6SG7 Mixer, 6SF7 IF Amp.-Det.-AVC, 6SJ7 AF Amp., 6V6GT Power Output, 5Y3GT Rectifier.
POWER SUPPLY	110-120 Volts AC
TUNING RANGE—BROADCAST	540-1730KC

RATING .525 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer parallel with base of dial. Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to large stator of tuning cap. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. Repeat adjustments until no further improvement can be made.
2	200MMFD.	High side to ext. antenna clip. Low side to chassis.	1400KC	1400KC	"	A5	Adjust for maximum output.
3	200MMFD	"	"	Tune for maximum output.	"	A6	" " " "

DISASSEMBLY INSTRUCTIONS

1. Remove three push-on type control knobs.
2. Remove one wood screw holding external antenna clip to chassis mounting board.
3. Remove phono-pickup plug from chassis.
4. Disconnect phono-motor plug.
5. Remove speaker plugs from speaker.
6. Remove four hex head screws holding chassis in cabinet. Remove chassis from cabinet.
7. Remove four hex nuts holding speaker in cabinet. Remove speaker from cabinet.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: STEWART-WARNER PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Oscillator	6J5	6J5	6Q	
2	Mixer	6SG7	6SG7	8BK	
3	IF Amp.-Det.-AVC	6SF7	6SF7	7AZ	
4	AF Amp.	6SJ7	6SJ7	8N	
5	Power Output	6V6GT	6V6GT	7AC	
6	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: STEWART-WAR. PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7A	20	400	502207	AF222J †	UP2245C	DY-312	EL-322	■ Filter
B	10	400		PRS25-20				▲ "
C	20	25						Bias Filter
8	.004	600	502150	684-004	DT6D4	ST-6-004	TC-24	Output Plate Bypass
9	.02	400	502152	484-02	DT4S2	ST-4-02	TC-12	Audio Coupling
10	.1	400	502410	484-.1	DT4P1	ST-4-1	TC-1	AF Plate Bypass
11	.004	600	502150	684-004	DT6D4	ST-6-004	TC-24	Tone Comp.
12	.25	400	502405	484-.25	DT4P25	ST-4-25	TC-2	Feedback
13	.05	400	502157	484-05	DT4S5	ST-4-05	TC-15	RF Bypass Pwr. Supply
14	.004	600	502150	684-005	DT6D4	ST-6-004	TC-24	Audio Coupling
15	.02	400	502152	484-02	DT4S2	ST-4-02	TC-12	Phono Tone Comp.
16	.05	200	502153	484-05	DT2S5	ST-4-05	TC-15	AVC Filter
17	.02	400	502152	484-02	DT4S5	ST-4-02	TC-12	RF Plate Decoupling
18	.05	400	502157	484-05	DT4S5	ST-4-05	TC-15	Screen Bypass
19	.05	200	502153	484-05	DT2S5	ST-4-05	TC-15	RF Cathode Bypass
20	.01	400	502151	484-01	DT4S1	ST-4-01	TC-11	Osc. Plate Bypass
21	260	500	502271	1468-00025	SW5T25	MO.5-325	1FM-325	AF Plate Bypass
22	100	500	502931	1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Bypass-Cer.
23	100	500	502931	1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Cap.-Cer.

†Parallel sections to obtain desired capacity.

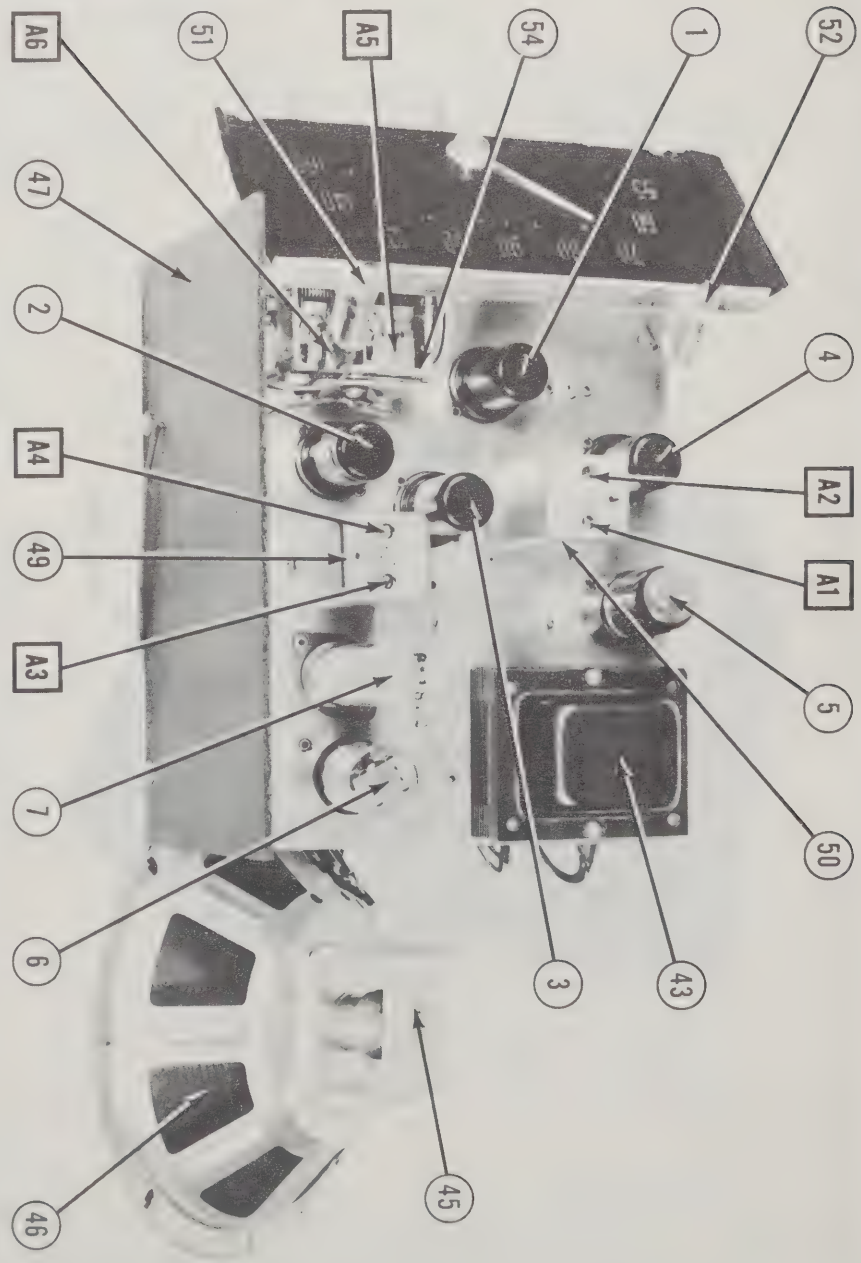
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: STEWART-WARNER PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
24A	1 Meg.	½	505318	D13-137	AM-65-Z	Volume Control
B	Shaft		Not Req.	L	KSS-3	Attach to 24A per instructions
C	Switch		" "	41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: STEWART-WARNER PART No.	IRC PART No.	IDENTIFICATION CODES
25	33KΩ	1	502466	BTA-33K	Or.-Or.-Or. Oscillator Plate Load
26	47KΩ	½	502131	BTS-47K	Yl.-Vi.-Or. Oscillator Grid
27	47KΩ	1	502288	BTA-47K	Yl.-Vi.-Or. Screen Dropping
28	2200Ω	½	502128	BTS-2200	Red-Red-Red Converter Cathode
29	6800Ω	½	502459	BTS-6800	Blue-Gray-Red Converter Plate Decoupling
30	3.3 Meg.	½	502269	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
31	47Ω	½	502264	BW-2-47	Yl.-Vi.-Blk. IF Cathode
32	47KΩ	½	502131	BTS-47K	Yl.-Vi.-Or. Diode RF Filter
33	100KΩ	½	502132	BTS-100K	Br.-Blk.-Yl. Series Phono
34	68KΩ	½	502408	BTS-68K	Blue-Gray-Or. Phono Tone Compensation
35	1500Ω	½	502406	BTS-1500	Br.-Grn.-Red AF Cathode
36	2.2 Meg.	½	502135	BTS-2.2 Meg.	Red-Red-Grn. AF Screen Dropping
37	220KΩ	½	502133	BTS-220K	Red-Red-Yl. AF Plate Load
38	220KΩ	½	502133	BTS-220K	Red-Red-Yl. AF Plate Decoupling
39	4.7 Meg.	½	502468	BTS-4.7 Meg.	Yl.-Vi.-Grn. AF Grid
40	470KΩ	½	502134	BTS-470K	Yl.-Vi.-Yl. Output Grid
41	3300Ω	2	504771	BT-2-3300	Or.-Or.-Red Filter
42	200Ω	2	502293	BW-2-220	Red-Blk.-Br. Bias

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	STEWART-WARNER PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
43	117V AC @ .525A	600V CT @ .058A	5.0V AC @ 1.82A	6.2V AC @ 2.02A	502174	P-6120#	T22R02#	P-2952#

#Drill new mounting holes.

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		STEWART-WARNER PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
44	8300Ω	3.5Ω	420Ω	.5Ω	505305	A-3878	T22S86	A-2900	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	VC IMP.	STEWART-WARNER PART No.	JENSEN PART No.	QUAM PART No.	
45	PM	3.5Ω	505342	ST-104* Mod. P8-S	8A31	*Replace output transformer to match 6-8 ohm voice coil.
46	CONE DIA. 7-3/4"	VC DIA. 3/4"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	STEWART-WARNER PART No.	MEISSNER PART No.
47	Loop Ant.	.1Ω	1.7Ω	505306	
48	Osc. Coil		4.9Ω	505326	14-1060
49	Input IF	17Ω	17Ω	502657	16-6658
50	Output IF	17Ω	17Ω	502658	16-6660

DIAL LIGHT

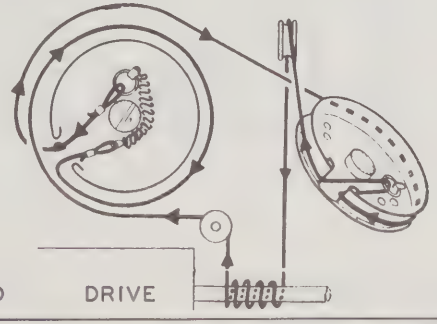
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					STEWART-WARNER PART No.		
51	Bayonet	6-8	0.25	Blue	110629		Type 44
52	"	"	"	"	110629		"

MISCELLANEOUS

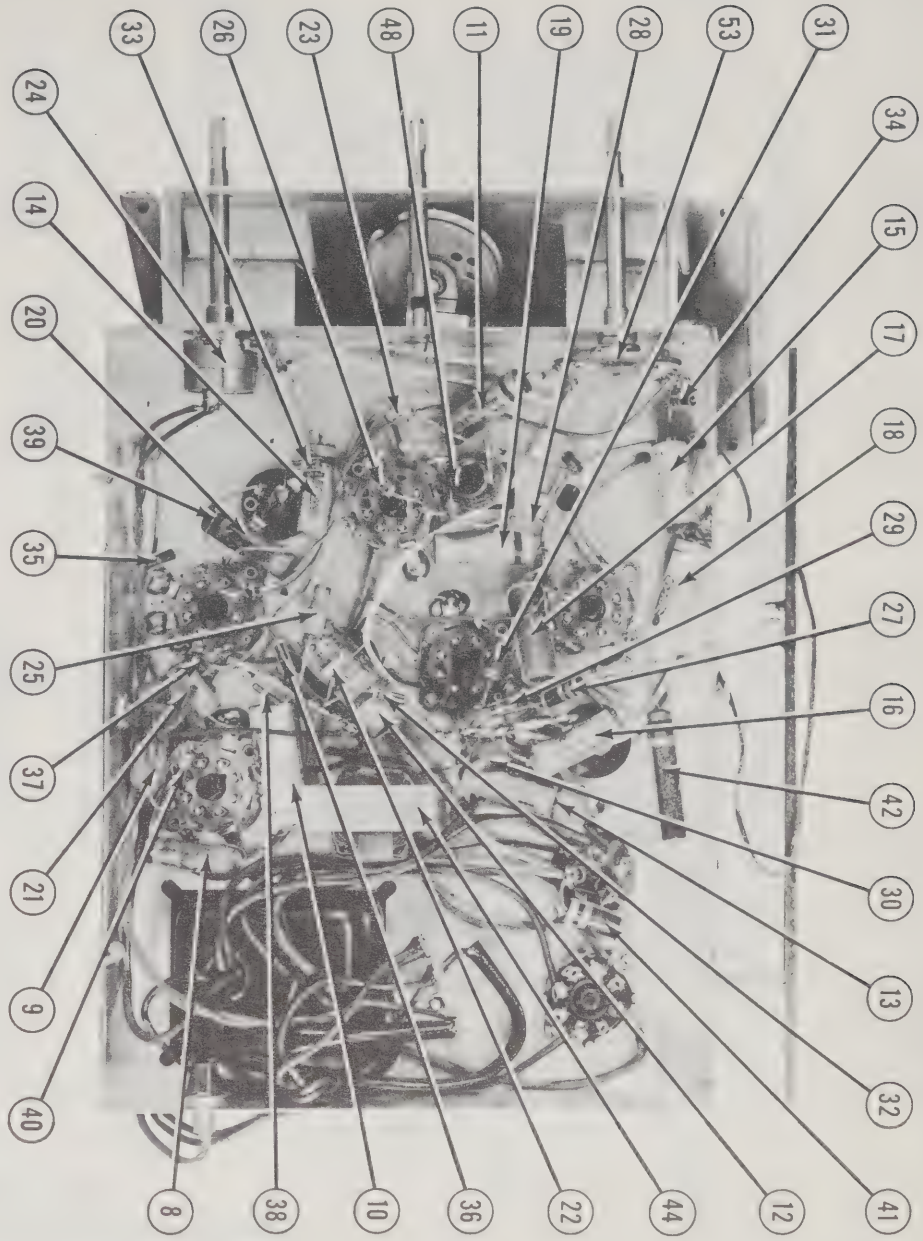
ITEM No.	PART NAME	STEWART-WARNER PART No.	NOTES
53	Switch	505317	Radio-Phono-Tone
54	2 Gang Var. Cap.	505315	(30-475 MMF, 31-195 MMF)
	Dial Scale	505324	
	Escutcheon	505333	Dial
	Dial Pointer	505686	

To string dial cord first slip pointer off its shaft. Then remove dial scale by taking out the six clips around its edges. Dial plate may now be taken off by removing the two screws which are visible and accessible at front of chassis. Now set gang condenser to fully open position and use the following parts:

114955 Clip on end of cord
117057 Cord (3 feet)
119087 Ring for dial cord
505161 Tension spring



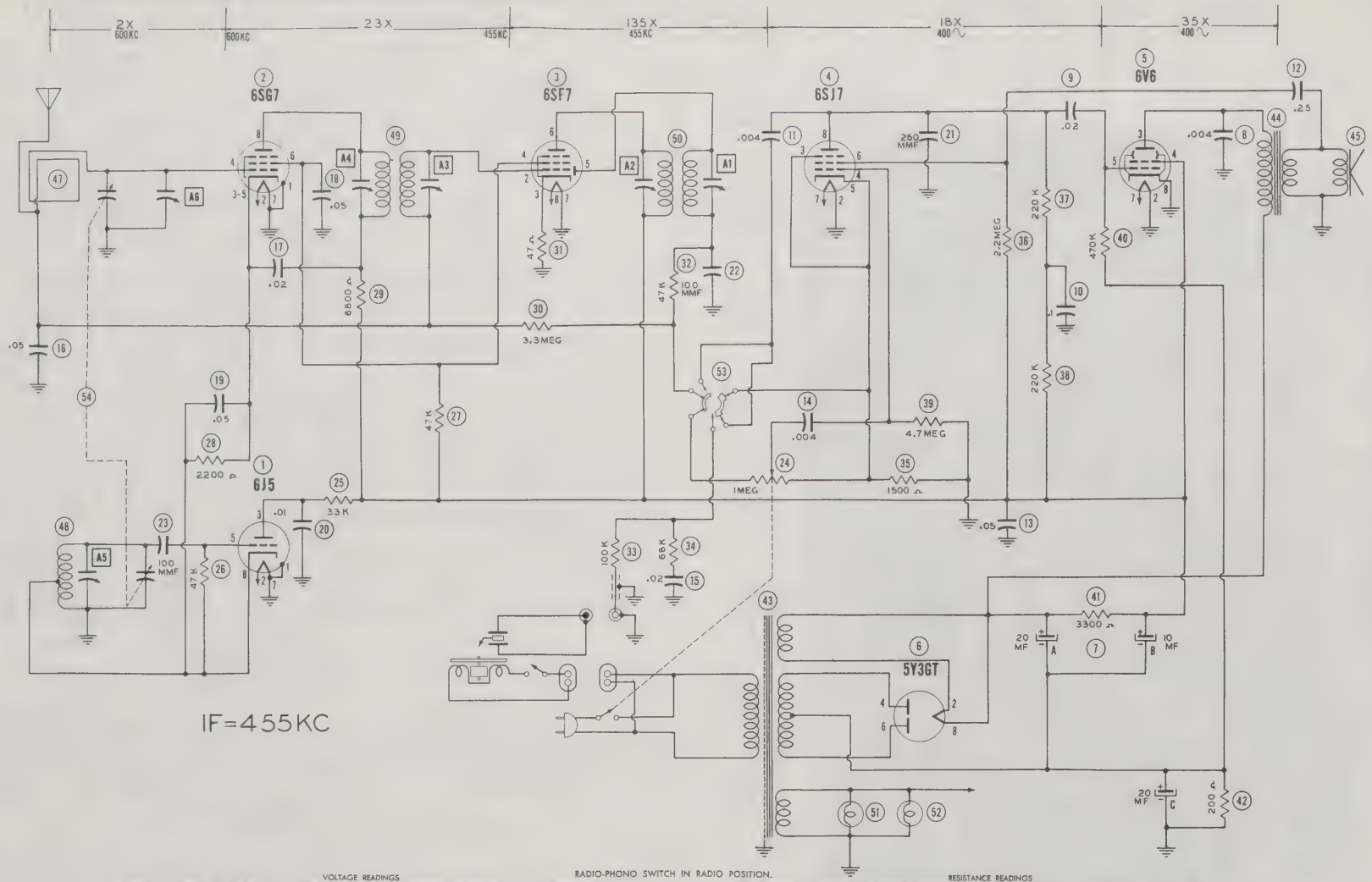
CHASSIS—BOTTOM VIEW



DATE 5/48-#489-25
SET #39-FOLDER #25

STEWART WARNER MODELS
A61CR1, A61CR2, A61CR3, A61CR4

STEWART WARNER MODELS
A61CR1, A61CR2, A61CR3, A61CR4



VOLTAGE READINGS

RADIO-PHONO SWITCH IN RADIO POSITION.

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6J5	0V.	6.3VAC	85VDC	0V.	-17VDC§	80VDC	0V.	0V.
2	6B07	0V.	6.2VAC	4.8VDC	-1.4VDC	4.1VDC	90VDC	0V.	230VDC
3	6SF7	0V.	-.3VDC	.6VDC	90VDC	0V.	240VDC	0V.	6.2VDC
4									
5									
6					.3VAC	0.	320VAC	0V.	310VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6J5	0Ω	.1Ω	530KΩ	1.1K.	47K.	940K.	0Ω	1.1K.
2	6B07	0Ω	.1Ω	2.2KΩ	4.5 Meg.	2.2KΩ	540KΩ	0Ω	500KΩ
3	6SF7	0Ω	4.5 Meg.	47C	540KΩ	1 Meg.	500KΩ	0Ω	.1Ω
4	6SJ7	0Ω	0Ω	1.5KΩ	4.7 Meg.	1.5KΩ	2.2 Meg.	.1Ω	940KΩ
5	6V6T	0Ω	0Ω	500KΩ	500KΩ	470KΩ	200Ω	.1Ω	0Ω
6	5Y3GT	INF.	500KΩ	INF.	360Ω	INF.	370Ω	INF.	500KΩ

RESISTANCE READINGS IN THE B- CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

PHOTOFACT* Folder

*TRADE MARK

TELE-TONE MODELS 100, 100-A, 101, 109, 111, 113, 122, 123, 125, 127, 130, 131 (Ch. Series "A")

TELE-TONE MODELS 100, 100-A, 101, 109, 111, 113, 122, 123, 125, 127, 130, 131 (Ch. Series "A")

TELE-TONE MODELS 100, 100-A, 101, 109, 111, 113, 122, 123, 125, 127, 130, 131 (Ch. Series "A")

TELE-TONE MODEL 111

TRADE NAME	Tele-Tone, Models 100, 100-A, 101, 109, 111, 113, 122, 123, 125, 127, 130, 131
MANUFACTURER	Tele-Tone Radio Co., 540 W. 58th St., New York 9, N.Y. (Ch. Series "A")
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 12BE6 Converter, 12BA6 IF Amp., 12AT6 Det.-AVC-AF, 50B5 Power Output, 35W4 Rectifier.
POWER SUPPLY	105-125 Volts AC-DC
TUNING RANGE—BROADCAST	530-1700KC RATING .23 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low freq. end of dial.

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to rear stator of tuning cap. Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD to reduce hum modulation.
2	200MMFD.	High side to ext. ant. lead. Low side to B-.	1500KC	1500KC	"	A5	Adjust for maximum output.
3	200MMFD.	"	"	Tune for maximum output.	"	A6	" " " "

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DATE 5/48-#489-26 SET #39-FOLDER #26

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: TELE-TONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1A	Converter	12BE6	12BE6	7CH	
B	"	12SA7	12SA7	5R	
2A	IF Amp.	12BA6	12BA6	7BK	
B	" "	12SK7	12SK7	8N	
3A	Det.-AVC-AF	12AT6	12AT6	7BT	
B	" " "	12SQ7	12SQ7	8Q	
4A	Power Output	50B5	50B5	7BZ	
B	" "	50L6GT	50L6GT	7AC	
5A	Rectifier	35W4	35W4	5BQ	
B	"	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: TELE-TONE PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	20	150		PRSA150-20-20	EZ42215	DS5-3x20-150	TA-220	Filter-Blue
B	20	150					"	-Grn.
C	20	150		PRS150-20			UT-201	" -Red
7	.02	400		484-02	DT4S2	ST-4-05	TC-12	Rectifier Bypass
8	.005	400		484-005	DT6D5	ST-6-005	TC-25	Output Plate Bypass
9	.01	400		484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
10	.005	400		484-005	DT4D5	ST-6-005	TC-25	" "
11	.05	400		484-05	DT4S5	ST-4-05	TC-15	AVC Filter
12	.05	400		484-05	DT4S5	ST-4-05	TC-15	Line Isolation
13	.005	400		484-005	DT6D5	ST-6-005	TC-25	Ant. Isolation-See Note
14	200	500		1468-0002	5W5T2	MO.5-32	1FM-32	Diode RF Filter

Note-Not used in all models.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: TELE-TONE PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
15A	500KΩ	½	A-VC-1	D13-133#	M-60-Z#	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 15A per instructions
C	Switch		" "	41	SW-A	" " " " "

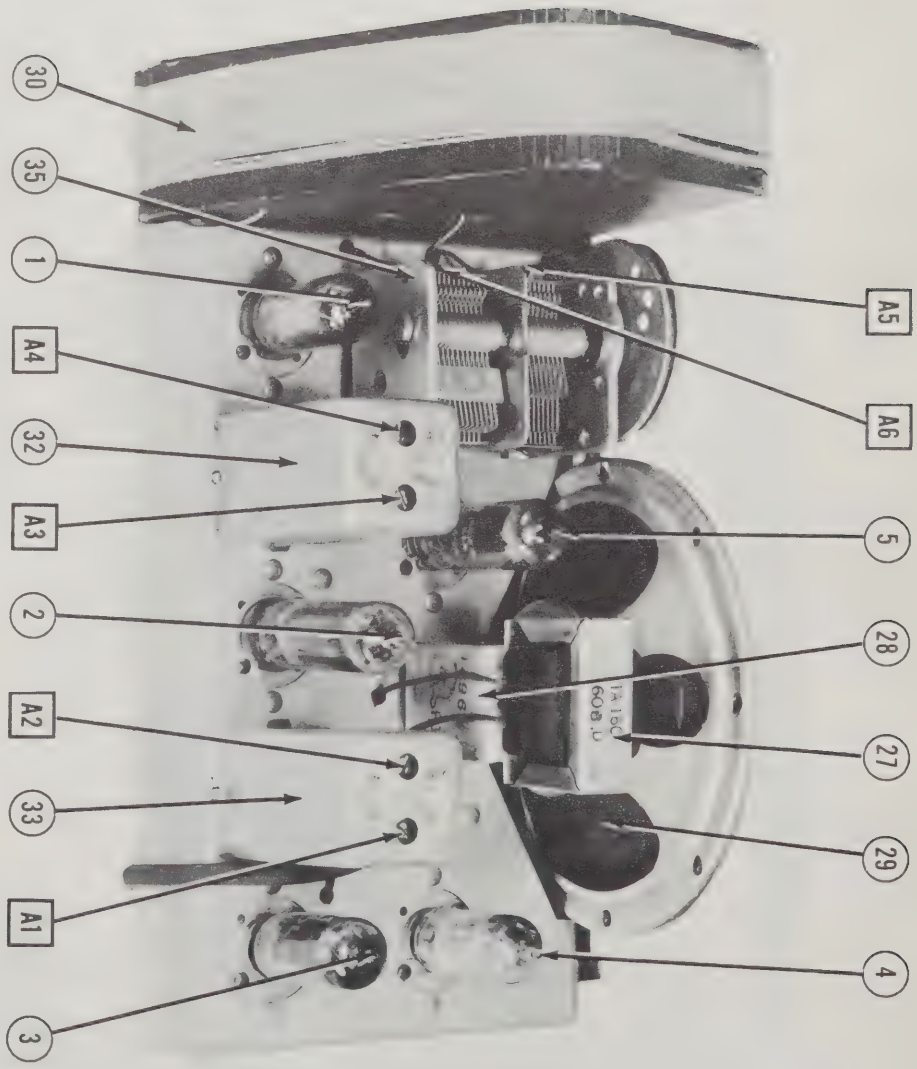
#Install a 47KΩ resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Controls viewed from shaft side, terminals down).

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: TELE-TONE PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
16	22KΩ	½		BTS-22K	Red-Red-Or. Oscillator Grid
17	100Ω	½		BW-½-100	Br.-Blk.-Br. IF Cathode-See Note
18	2.2 Meg.	½		BTS-2.2 Meg.	Red-Red-Grn. AVC Network
19	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue AF Grid
20	220KΩ	½		BTS-220K	Red-Red-Yl. AF Plate Load
21	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. Output Grid
22	3300Ω	½		BTS-3300	Or.-Or.-Red Tone Compensation-See Note
23	150Ω	1		BW-1-150	Br.-Grn.-Br. Output Cathode
24	1500Ω	½		BTS-1500	Br.-Grn.-Red Filter
25	100Ω	1		BW-1-100	Br.-Blk.-Br. "
26	18Ω	½		BW-½-18	Br.-Gray-Blk. Surge Limiter

Note-Not used in all models.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		TELE-TONE PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
27	14000Ω	3.2Ω	148Ω	.5Ω	Part of A-SP1	A-3876†	T22S45†	A-2028†	†Bend mounting tabs down, file out slots and mount on original bracket.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			TELE-TONE PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD RES.	VC IMP.		ST-105 ‡		
28	PM	3.2Ω	A-SP1	Mod. P5-X	5A1‡	‡Drill and tap magnet frame.
	CONE DIA.	VC DIA.				
29	4-5/8"	1/2"				

R F COILS

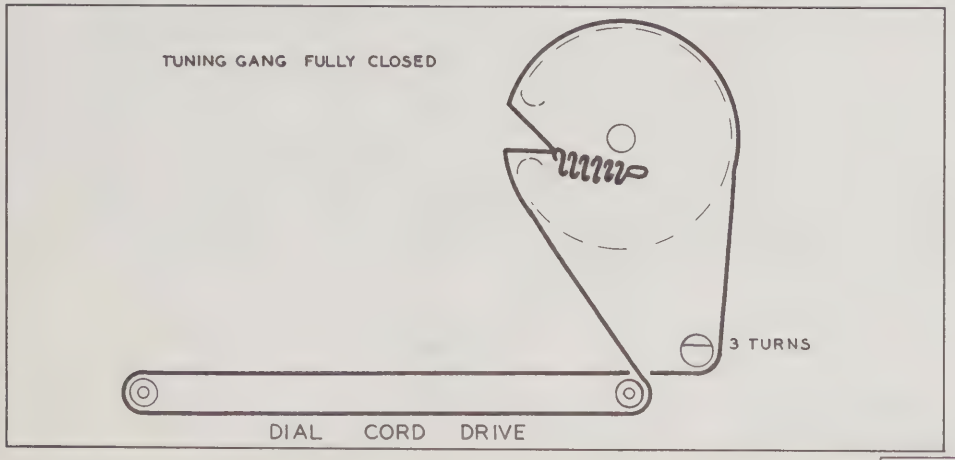
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	TELE-TONE PART No.	MEISSNER PART No.	
30	Loop Ant.	.3Ω	1.2Ω			
31	Osc. Coil	.5Ω	5.5Ω		14-1060	
32	Input IF	18.5Ω	18.5Ω	A-LF1	16-6658	
33	Output IF	16Ω	16Ω	A-LF3	16-6660	

DIAL LIGHT

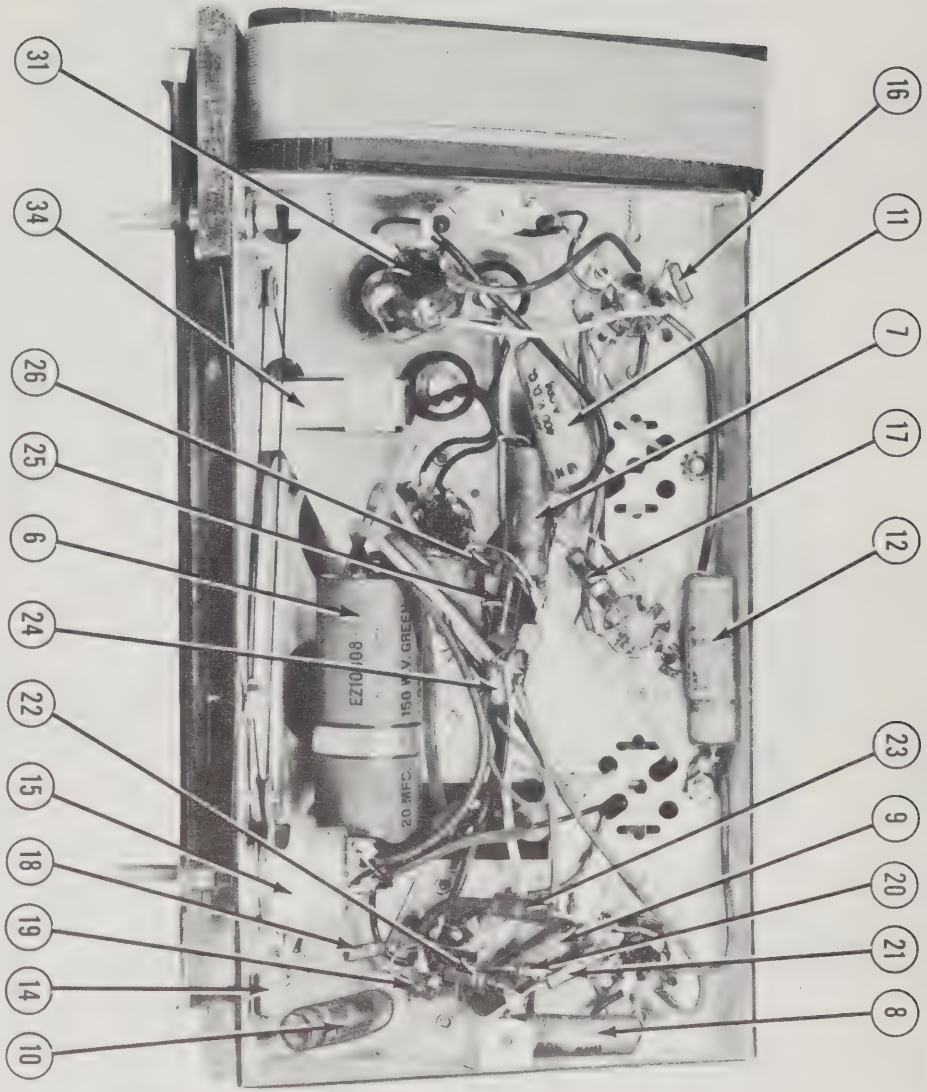
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					TELE-TONE PART No.		
34	Bayonet	6-8	.15	Brown			Type 47

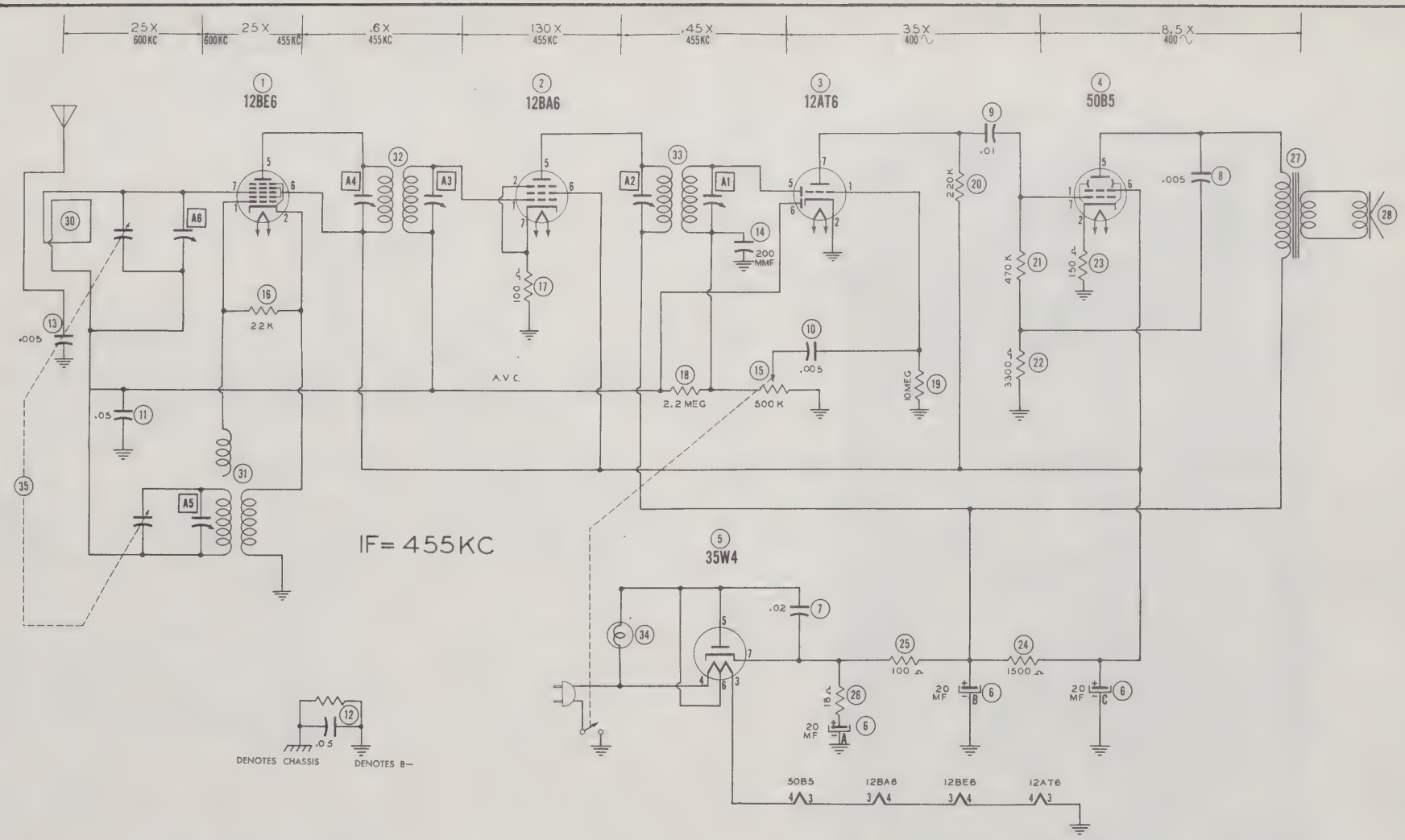
MISCELLANEOUS

ITEM No.	PART NAME	TELE-TONE PART No.	NOTES
35	2 Gang Var.Cap.	A-CV1	(35-483 MMF, 25-187MMF)



CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BE6	-.4VDC§	0V.	37VAC	12VAC	92VDC	92VDC	-.4VDC
2	12BA6	-.4VDC	0V.	37VAC	25VAC	111VDC	92VDC	.95VDC
3	12AT6	-.6VDC	0V.	0V.	12VAC	-.4VDC	-.4VDC	57VDC
4	50B5	0V.	6VDC	37VAC	85VAC	105VDC	92VDC	0V.
5	35W4	116VDC	0V.	85VAC	117VAC	112VAC	112VAC	16VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BE6	22KΩ	.5Ω	25Ω	12Ω	500KΩ	500KΩ	2.7 Meg
2	12BA6	2.7 Meg.	0Ω	38Ω	25Ω	500KΩ	500KΩ	100Ω
3	12AT6	10 Meg.	0Ω	0Ω	12Ω	500KΩ	2.7 Meg.	720KΩ
4	50B5	470KΩ	150Ω	38Ω	90Ω	500KΩ	500KΩ	470KΩ
5	35W4	500KΩ	INF.	90Ω	120Ω	118Ω	118Ω	500KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

TRUETONE MODEL D-3810
BATTERY-LINE OPERATED

TRUETONE MODEL D-3810
BATTERY-LINE OPERATED

TRUETONE MODEL D-3810

TRADE NAME	Truetone, Model D-3810
SUPPLIER	Western Auto Supply Co., 2107 Grand Ave., Kansas City, Mo.
TYPE SET	Three Power Operated Portable Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 1R5 Converter, 1U4 IF Amp., 1S5 Det.-AVC-AF, 3S4 Power Output, 117Z3 Rectifier.
POWER SUPPLY	105-125 Volts AC-DC or 7.5 Volts "A" Supply and 67.5 Volts "B" Supply
RATING	.14 Amp. @ 117 Volts AC or 53MA @ 7.5 Volts DC and 8.3MA @ 67.5 Volts DC
TUNING RANGE—BROADCAST	540-1700KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use battery power when available. If AC power is used, use an isolation transformer when available. If not, connect a .1 MFD capacitor in series with low side of the signal generator and B-.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to rear stator of tuning cap. Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If AC power is used without an isolation transformer reduce dummy ant. to 200 MMFD to reduce hum modulation.
2		Loop	1700KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1500KC	Tune for maximum output.	"	A6	Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	1R5	1R5	7AT	
2	IF Amp.	1U4	1U4	6AR	
3	Det.-AVC-AF	1S5	1S5	6AU	
4	Power Output	3S4	3S4	7BA	
5	Rectifier	117Z3	117Z3	4BR	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: TRUETONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	25	150	CE-12	PRSA302010-150	EZ3315	DSB-2x30-150	TA-330	Filter - Grn.
B	25	150						" - Red
C	125	10			BRH601	M-100-12	UHC-112	Filament Bypass-Yl.
7	.05	400	CP503-5	484-05	DT4S5	MPH-4-05	TC-15	Line Filter
8	.005	400	CP502-2	484-005	DT6D5	ST-6-005	TC-25	Output Plate Bypass
9	.01	150	CP103-2	484-01	DT2S1	ST-4-01	TC-11	Bias Filter
10	.002	200	CP202-3	484-002	DT6D2	ST-6-002	TC-22	Audio Coupling
11	.01	150	CP103-2	484-01	DT2S1	ST-4-01	TC-11	AF Screen Bypass
12	.001	600	CP102-3	484-001	DT6D1	ST-6-001	TC-21	Audio Coupling
13	.01	150	CP103-2	484-01	DT2S1	ST-4-01	TC-11	IF Grid Filter
14	.05	200	CP503-5	484-05	DT2S5	ST-4-05	TC-15	Filament Bypass
15	.01	150	CP103-2	484-01	DT2S1	ST-4-01	TC-11	Conv. Decoupling
16	.1	200	CP104-2	484-.1	DT2P1	ST-4-1	TC-1	Line Isolation
17	.05	200	CP503-5	484-05	DT2S5	ST-4-05	TC-15	AVC Filter
18	.05	200	CP503-5	484-05	DT2S5	ST-4-05	TC-15	Filament Bypass
19	100	500	CM101-1	1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter
47	100	500	CM101-1	1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: TRUETONE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
20	1 Meg.	½	VC-6			Volume Control & Sw.

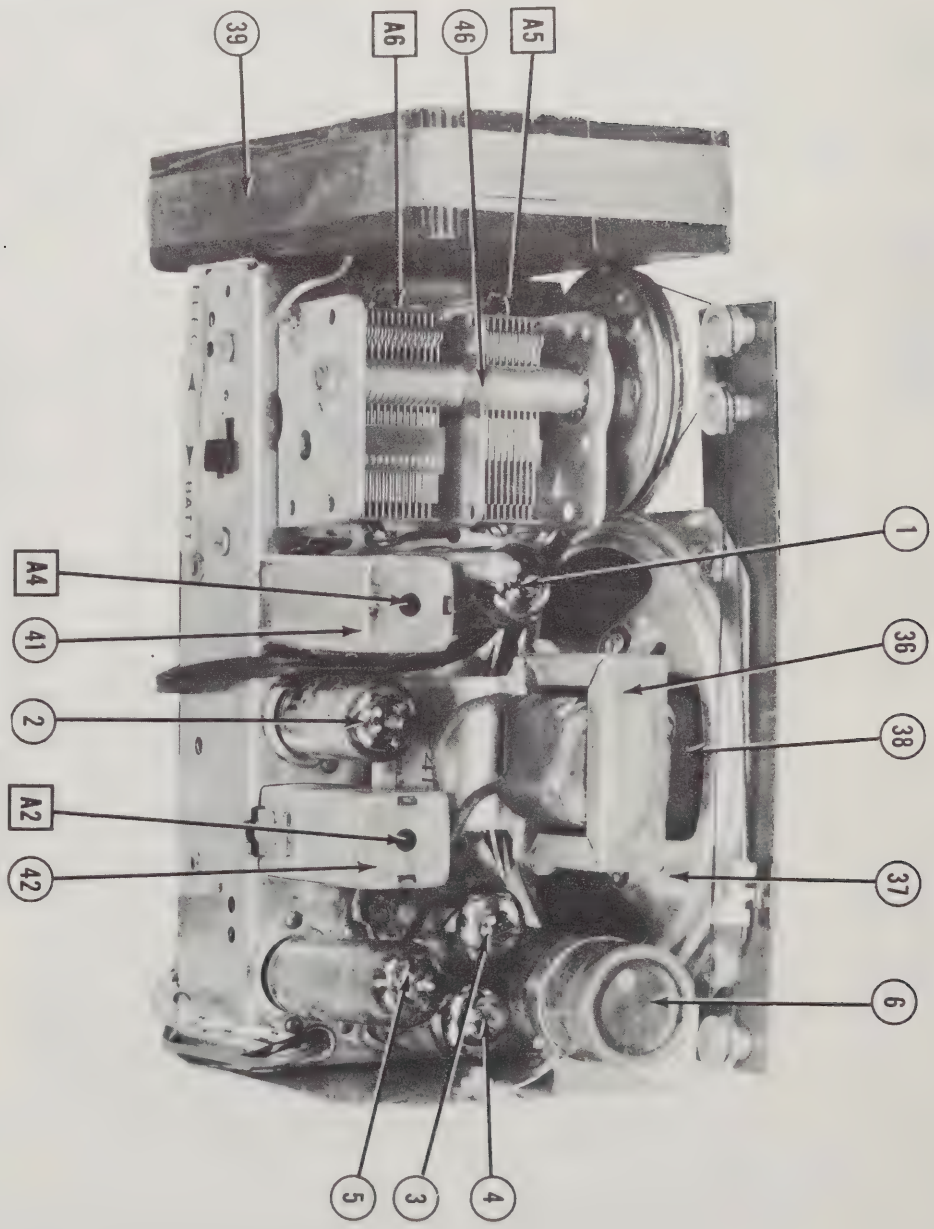
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: TRUETONE PART No.	IRC PART No.	IDENTIFICATION CODES
21	100KΩ	½	RC104-2	BTS-100K	Br.-Blk.-Yl. Oscillator Grid
22	3.3 Meg.	½	RC335-1	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
23	15KΩ	½	RC153-1	BTS-15K	Br.-Grn.-Or. Converter Decoupling
24	10 Meg.	½	RC106-1	BTS-10 Meg.	Br.-Blk.-Blue IF Grid
25	10 Meg.	½	RC106-1	BTS-10 Meg.	Br.-Blk.-Blue AF Grid
26	3.3 Meg.	½	RC335-1	BTS-3.3 Meg.	Or.-Or.-Grn. AF Screen Dropping
27	1 Meg.	½	RC105-2	BTS-1 Meg.	Br.-Blk.-Grn. AF Plate Load
28	2 Meg.	½	RC205-1	BTS-2.2 Meg.	Red-Blk.-Grn. Output Grid
29	1 Meg.	½	RC105-2	BTS-1 Meg.	Br.-Blk.-Grn. Bias Network
30	270KΩ	½	RC274-2	BTS-270K	Red-Vi.-Yl. Bias Network
31	470Ω	½	RC471-1	BTS-470	Yl.-Vi.-Br. Filament String
32	820Ω	½	RC821-2	BTS-820	Gray-Red-Br. " " Filament Dropping
33	2650Ω	10	RP-3		
34	6800Ω	1	RC682-5	BTA-6800	Blue-Gray-Red Filter
35	18Ω	½	RC180-1	BW-½-18	Br.-Gray-Blk. Surge Limiter

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: TRUETONE PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
36	5800Ω	3.0Ω	440Ω	.6Ω	TR-7	A-3877*	T22S45*	A-2900*	*Bend mounting tabs down, file out slots and mount on original bracket.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			TRUETONE PART No.	JENSEN PART No.	QUAM PART No.	
37	FIELD	VC IMP.	SP-41-7			
	PM	3.0Ω				
38	CONE DIA.	VC DIA.	NOT READILY REPLACEABLE-USE COMPLETE SPEAKER UNIT			
	4"	1/2"				

R F COILS

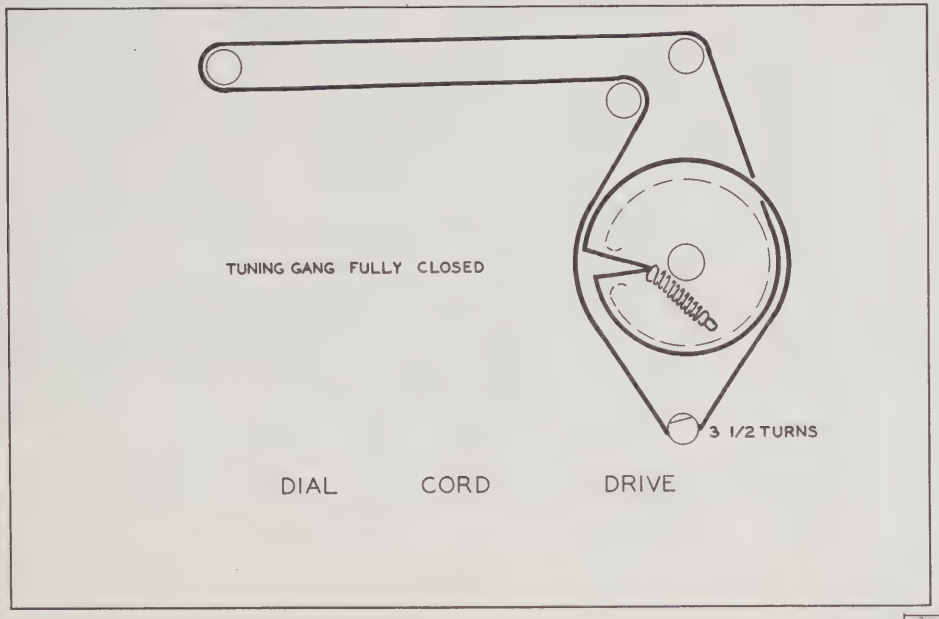
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	TRUETONE PART No.	MEISSNER PART No.	
39	Loop Ant.		2.5Ω	LP6		
40	Osc. Coil	1.5Ω	4.1Ω	LC4	14-1040†	†Add 50MMFD from osc. grid to high side tuning cap.
41	Input IF	14.9Ω	14.9Ω	LF22	16-6668	
42	Output IF	14.9Ω	14.9Ω	LF22	16-6669	

BATTERIES

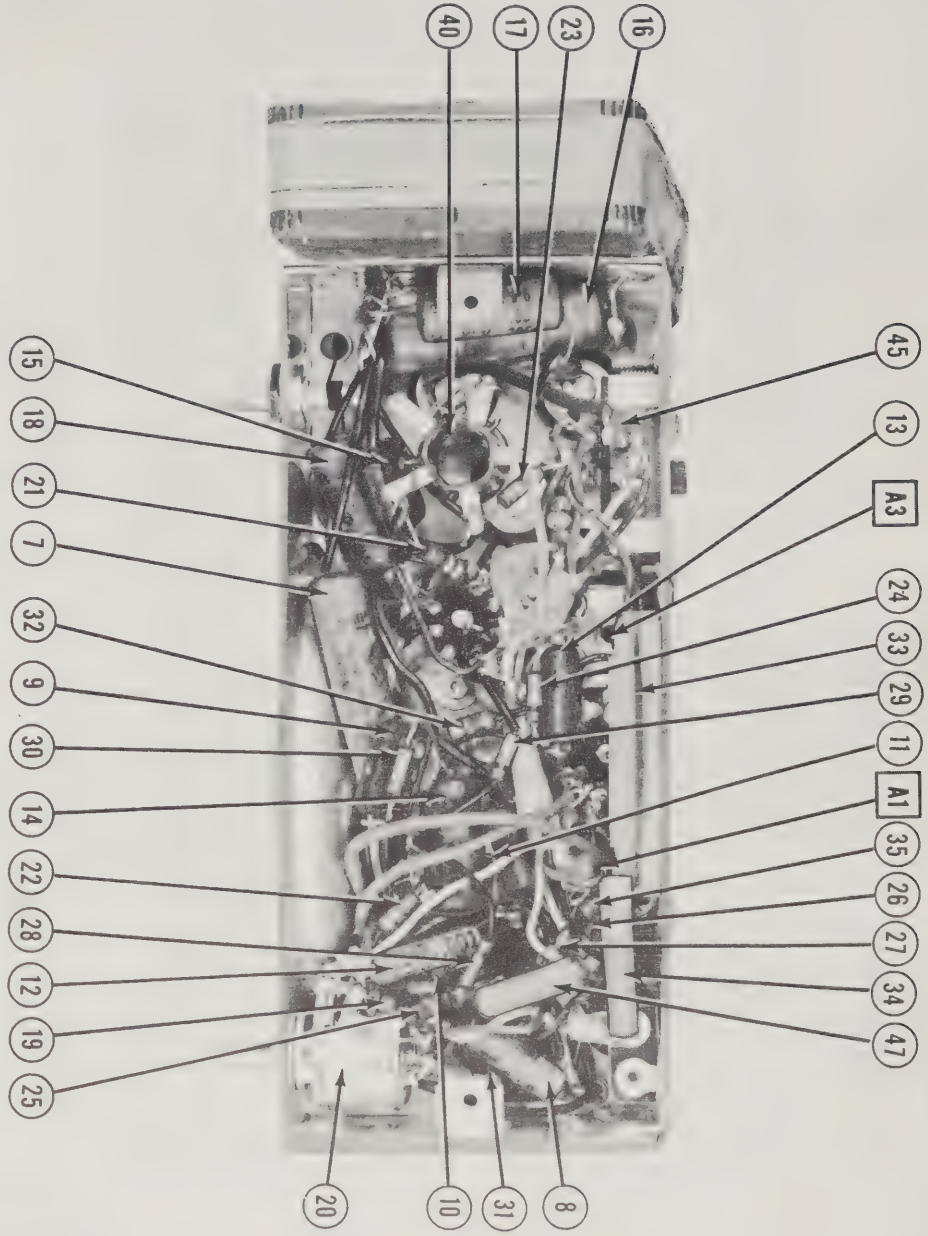
ITEM No.	VOLTAGE	TRUETONE PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
43	7.5V "A"		#950			#2R			5 Used in series
44	67.5V "B"			#467			#XX45		

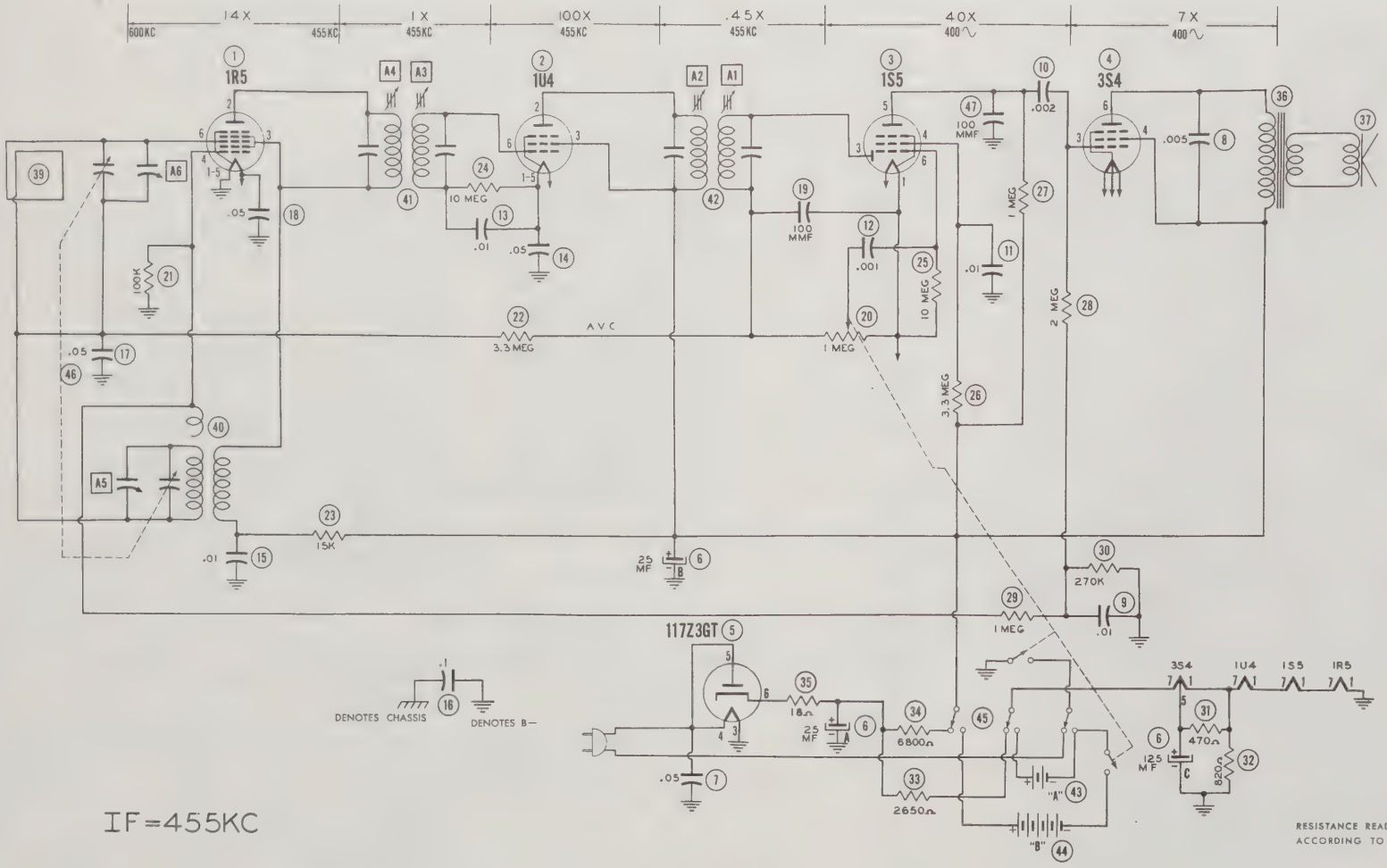
MISCELLANEOUS

ITEM No.	PART NAME	TRUETONE PART No.	NOTES
45	Switch	SW-10	AC-LC-Batt.
46	2 Gang Var. Cap.	CV10	(34-470MMF, 21-183MMF)



CHASSIS—BOTTOM VIEW





VOLTAGE AND RESISTANCE READINGS TAKEN IN AC-DC POSITION.

Pin No	1R5 Volt	1R5 Res.	1U4 Volt	1U4 Res.
1	0V.	*	1.4VDC	*
2	37VDC	24K	85VDC	8.5K
3	37VDC	24K	85VDC	8.5K
4	117VDC	1.0K	65VDC	8.5K
5	0V.	*	4VDC	*
6	0V.	4.5 Meg.	0V.	10 Meg.
7	1.3VDC	*	4VDC	*

§TAKEN WITH VACUUM TUBE VOLTMETER.

Pin No.	1S5 Volt.	1S5 Res.	3S4 Volt.	3S4 Res.
1	1.3VDC	*	4VDC	*
2	0V.	INF.	82VDC	8.5KΩ
3	-.2VDC	1 Meg.	-.15VDC	2 Meg.
4	4.3VDC	3.3 Meg.	65VDC	8.5KΩ
5	8VDC	1 Meg.	5.2VDC	*
6	0V.	10 Meg.	82VDC	8.5KΩ
7	2.6VDC	*	7.5VDC	*

Pin No.	117Z3 Volt.	117Z3 Res.
1	117VAC	440Ω
2	0V.	INF.
3	0V.	0Ω
4	117VAC	440Ω
5	117VAC	440Ω
6	124VDC	2.5KΩ
7	0V.	INF.

*DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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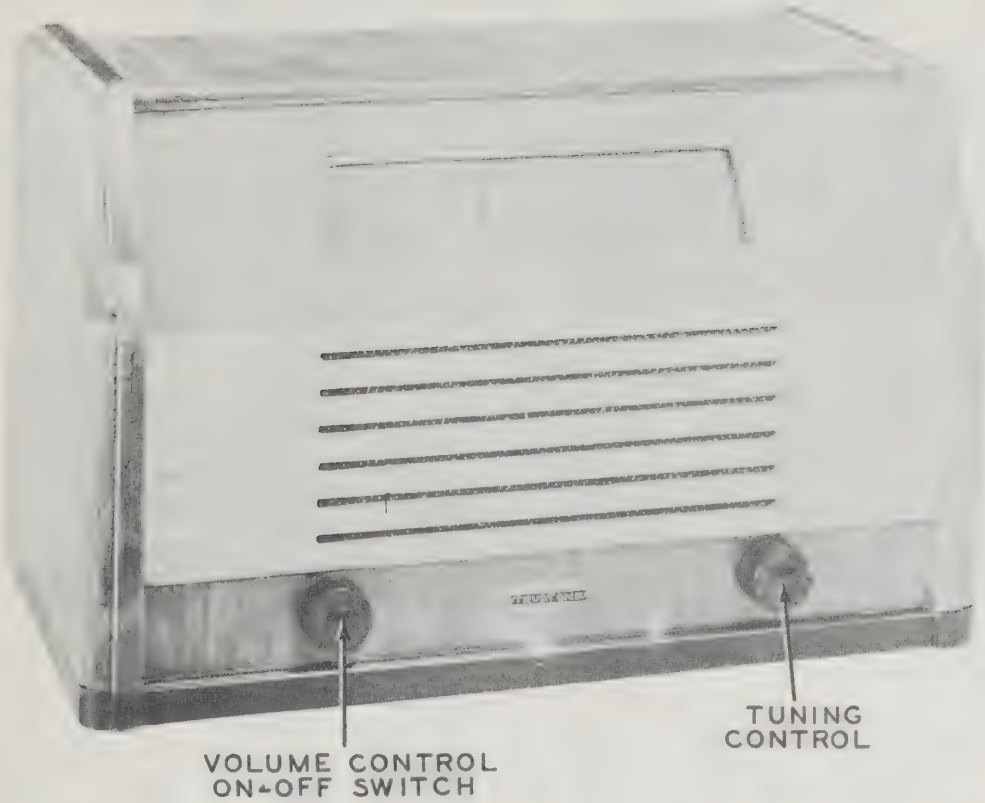
The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by shorting AVC to low side of volume control.

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - Volume control at maximum, no signal applied for voltage measurements.

TRUETONE MODEL
D-2692



TRUETONE MODEL
D-2692

TRADE NAME	Truetone, Model D2692
SUPPLIER	Western Auto Supply Co., 2107 Grand Ave., Kansas City, Mo.
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (SIX)	Types, 12SK7 RF Amp., 12SA7 Converter, 12SK7 IF Amp., 12SQ7 Det.-AVC-AF, 35L6GT Power Output, 35Z5GT Rectifier
POWER SUPPLY	110-120 Volts AC-DC
TUNING RANGE—BROADCAST	525-1740KC RATING .23 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low freq. end of dial.

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.05 MFD	High side to Pin 8 (grid) of 12SA7. Low side to chassis.	455KC	540KC	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy antenna to .001 MFD. to reduce hum modulation.
2		Loop	1500KC	1500KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	"	Tune for max. output.	"	A6	Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		TRUETONE PART No.	STANDARD REPLACEMENT		
1	RF Amp.	12SK7GT	12SK7GT	7AM	
2	Converter	12SA7GT	12SA7GT	7AD	
3	IF Amp.	12SK7GT	12SK7GT	7AM	
4	Det.-AVC-AF	12SQ7GT	12SQ7GT	7AQ	
5	Power Output	35L6GT	35L6GT	7AC	
6	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	TRUETONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
7A	40	150		PRSAL6-40-40	BR24415	M-2x40-150	TA-440	Filter-Red
B	40	150						" -Green
8	.05	400		484-.05	DT4S5	ST-4-05	TC-15	Line Filter
9	.02	600		684-.02	DT6S2	ST-6-02	TC-12	3rd Plate Bypass
10	.01	400		484-.01	DT4S1	ST-4-01	TC-11	Audio Coupling
11	.002	600		684-.002	DT6D2	ST-6-002	TC-22	" "
12	.2	200		484-.2	DT4P2	ST-4-2	TC-2	RF Bypass Pwr. Supp.
13	.05	400		484-.05	DT4S5	ST-4-05	TC-15	AVC Filter
14	.005	600		684-.005	DT6D5	ST-6-005	TC-25	Ant. Coupling
15	100	500		1468-.0001	5W5T1	MO.5-31	1FM-31	Audio Plate Bypass
16	250	500		1468-.00025	5W5T25	MO.5-325	1FM-325	RF Bypass Diode
17	50	500		1468-.00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.
18	100	500		1468-.0001	5W5T1	MO.5-31	1FM-31	RF Coupling

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	TRUETONE PART No.	IRC PART No.	CLAROSTAT PART No.	
19A	500KΩ	1	[illegible]		M-60-Z	Volume Control
B	Shaft		Not Req.		Not Req.	Attach to 19A per instructions
C	Switch		" "		SW-A	" " " " "

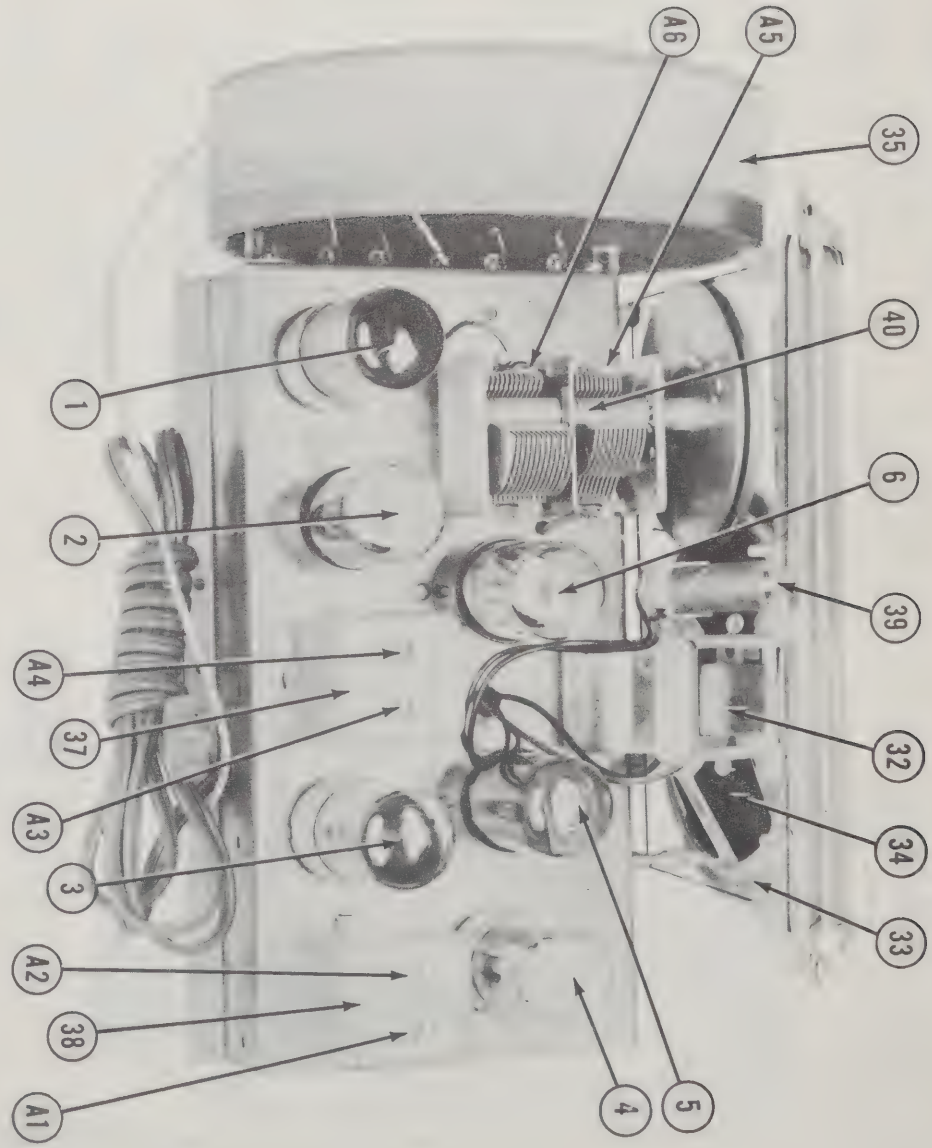
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	TRUETONE PART No.	IRC PART No.	
20	2.2MΩ	½		BW-½-330	Red-Red-Br. Pilot Light Shunt
21	1.0MΩ	½		BTS-1000	Br.-Blk.-Red Ant. Loading
22	47KΩ	½		BTS-4700	Yl.-Vi.-Red RF Plate Load
23	1.0MΩ	½		BTS-100K	Br.-Blk.-Yl. Conv. Grid Load
24	2.2 Meg.	½		BTS-2.2 Meg.	Red-Blk.-Grn. AVC Network
25	220KΩ	½		BTS-220K	Red-Yl.-Or. Osc. Grid
26	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue 1st AF Grid
27	270KΩ	½		BTS-270K	Or.-Blk.-Yl. 1st AF Plate Load
28	470KΩ	½		BTS-470K	Grn.-Blk.-Yl. Output Grid
29	1.5Ω	1		BW-1-150	Br.-Grn.-Br. Output Cathode
30	2.2KΩ	5		AB-2000	Red-Red-Red Filter
31	33Ω	1		BW-1-33	Or.-Or.-Blk. Rectifier Ballast

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		TRUETONE PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
32	2500Ω	3.2Ω	250Ω	.7Ω		A-3076*	T-25S4*	A-2424*	*Mount on chassis.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: TRUETONE PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.		ST-105		
32	PM	2.2Ω		Mod. P5-X	5a15	
	CONE DIA.	VC DIA.				
34	4-1/2"	3/16"				

R F COILS

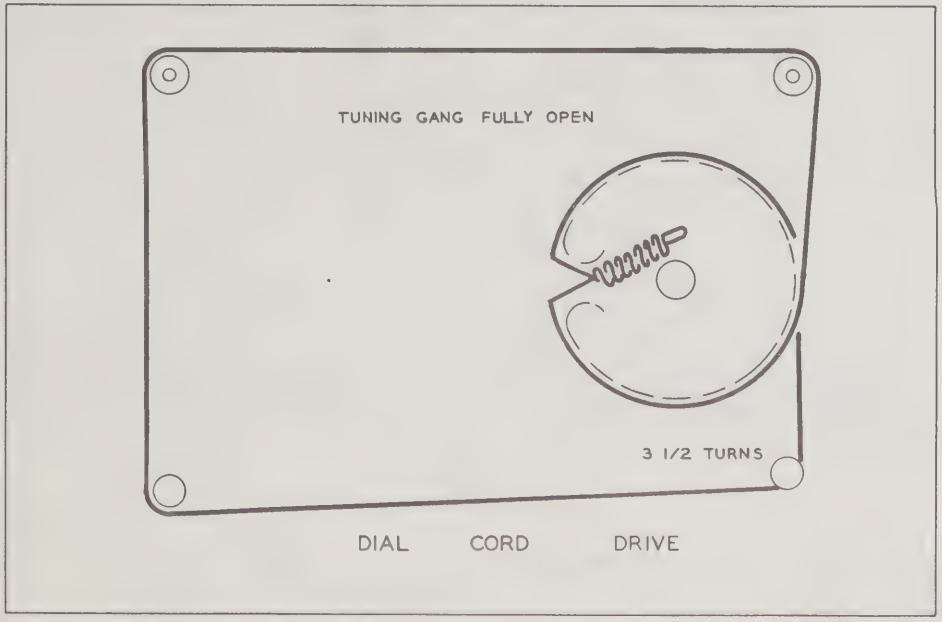
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: TRUETONE PART No.	MEISSNER PART No.
35	Loop Ant.	.1Ω	1.5Ω		
36	Osc. Coil		6.4Ω		14-1060
37	Input IF	20Ω	20Ω	3329	16-6658
38	Output IF	16.7Ω	18.9Ω	3529	16-6660

DIAL LIGHT

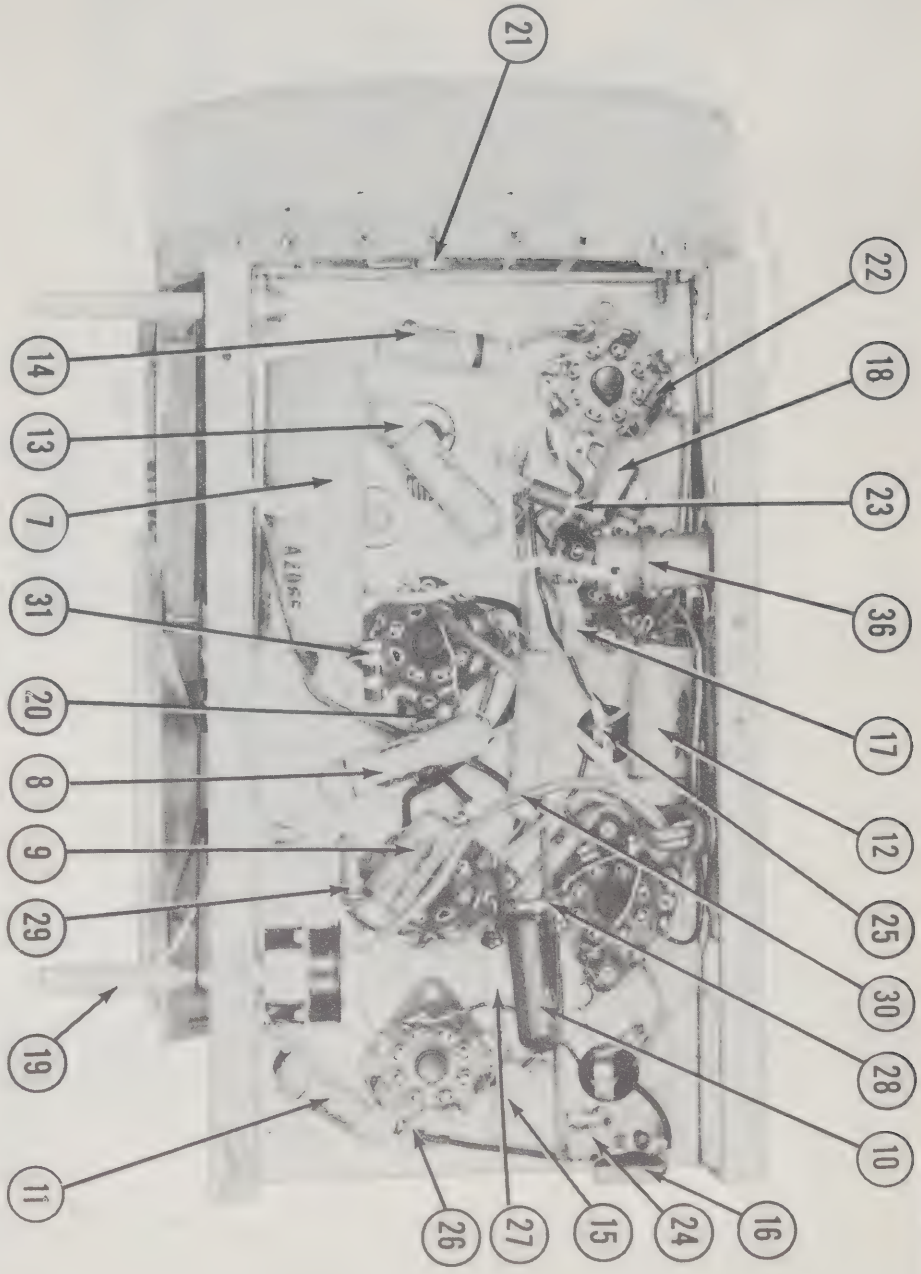
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: TRUETONE PART No.		INSTALLATION NOTES
30	Bayonet	6-8	0.15	Brown			Type 47

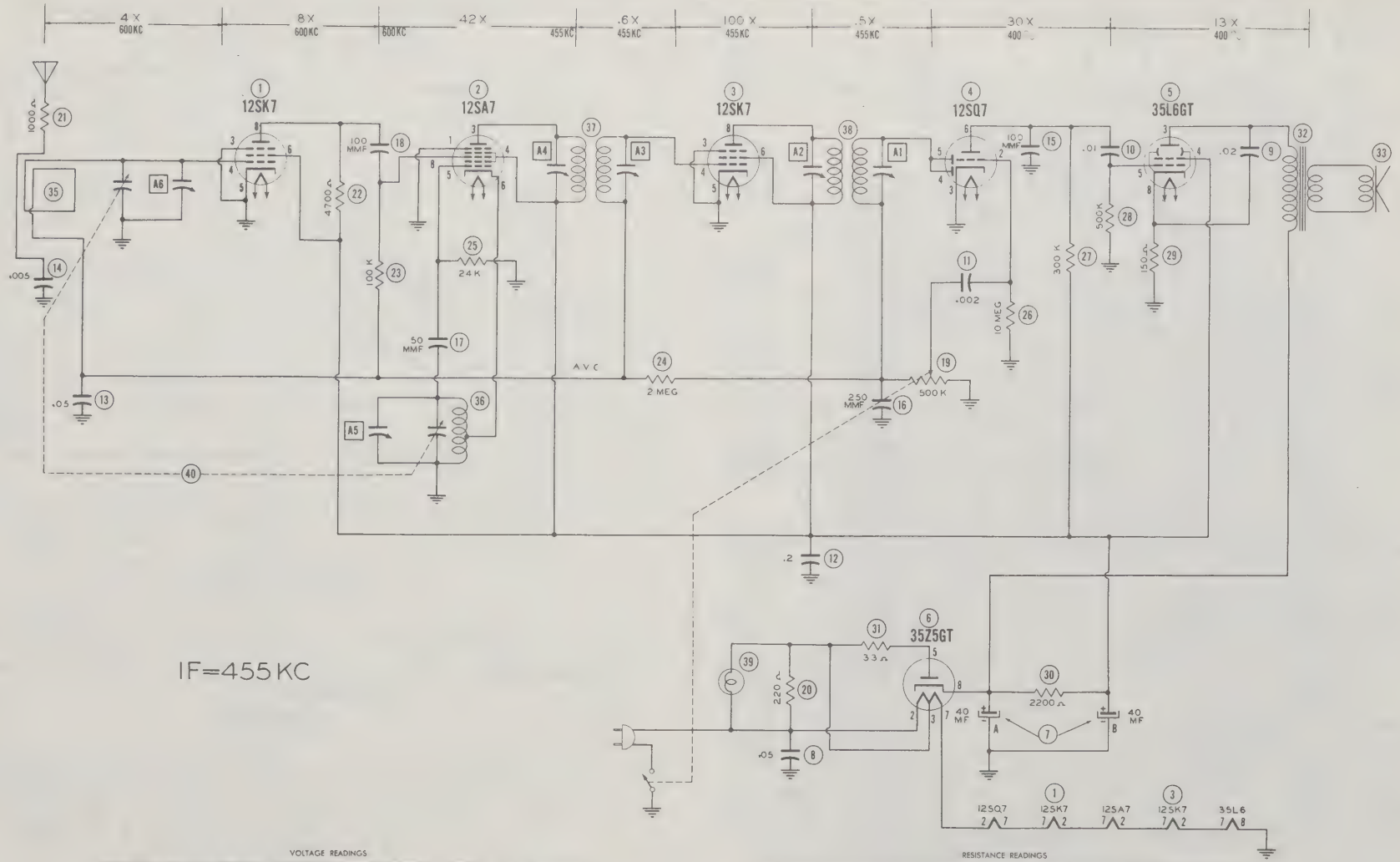
MISCELLANEOUS

ITEM No.	PART NAME	TRUETONE PART No.	NOTES
40	Tuning Cap.		2 Gang Variable Cap.



CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SK7GT								
2	12SA7GT								
3	12SK7GT								
4	12SQ7GT								
5	35L6GT	0V.	86VAC	115VDC					
6	35Z5GT	0V.	117VAC	113VAC					

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SK7GT	0Ω	38Ω	0Ω	2.2 MegΩ	0Ω	35KΩ	52Ω	35KΩ
2	12SA7GT	0Ω	26Ω	35KΩ	35KΩ	22.7KΩ	.5Ω	38Ω	2.2
3	12SK7GT	0Ω	38Ω	0Ω	2.2 MegΩ	0Ω	35KΩ	52Ω	35KΩ
4	12SQ7GT	0Ω	8 MegΩ	0Ω	480KΩ	480KΩ	340KΩ	120Ω	0Ω
5									
6	35Z5GT	0Ω	110Ω	110Ω	INF.	140Ω	110Ω		

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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489-28

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of + 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

TOP VIEW

GENERAL INFORMATION

The "Concert" CD40 is an automatic, four-knob control changer designed to play up to ten 10-inch records or eight 10-inch and 12-inch records mixed in any order. On completion of the last record it will stop automatically.

Four different types of pickups have been used: the "CRYSTAL" as illustrated, "RONDO," a high impedance electro-magnetic type, "GAVOTTE," a low impedance electro-magnetic type, and "FUGUE SPECIAL," a low impedance electrodynamic.

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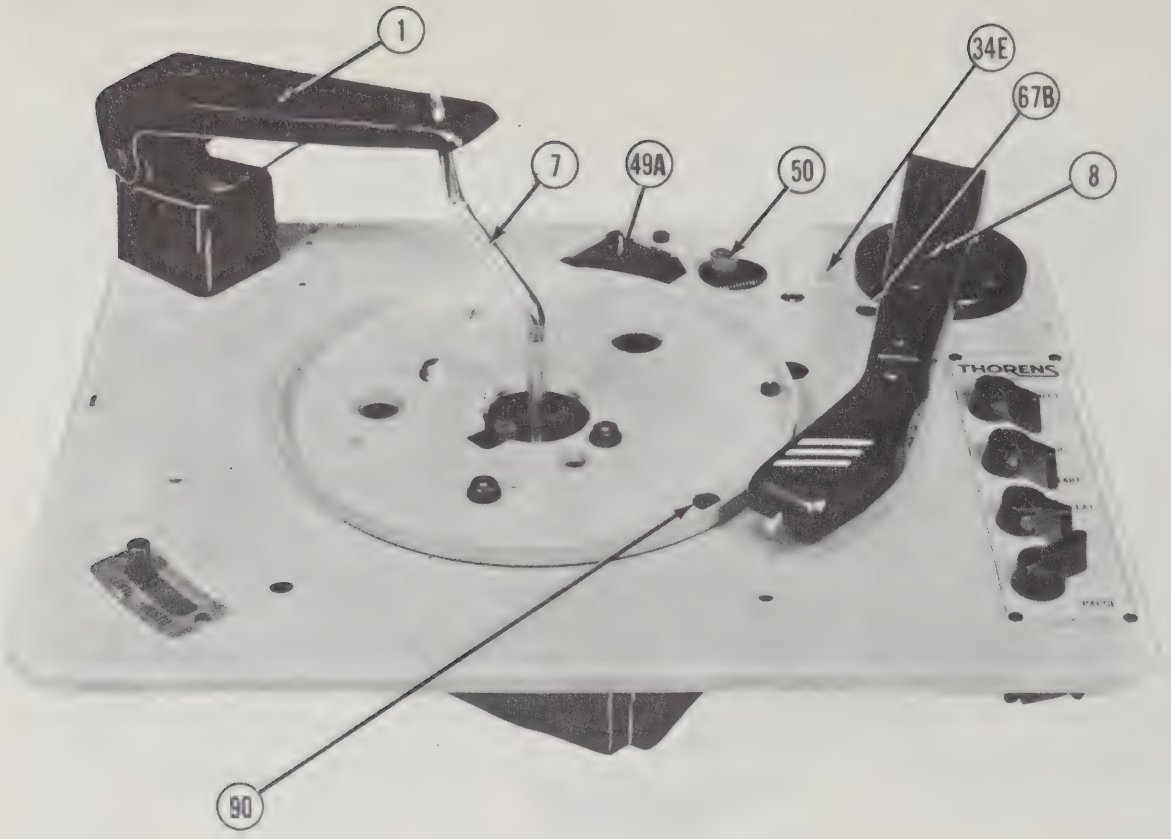
THORENS
MODEL CD40

THORENS
MODEL CD40



TOP VIEW LESS TURNTABLE

OPERATING INSTRUCTIONS

1. Raise the overarm (1) to its most upward position. The screws (28) are used for the stop of the overarm.

2. Place up to ten 10-inch records or eight 10-inch and 12-inch, mixed in any order, on the spindle shoulder. The lowest record will be played first.

3. Turn the record spindle so that records will rest on the platform (29) and the top of the spindle will align with the hole in the overarm.

4. Lower the overarm with the end of the spindle extending through the hole of the arm. Make sure that the overarm is completely lowered on to the record spindle.

5. Insert a needle of a good type.

6. Turn the stop control knob to start. The changer will now play the entire stack of records and on completion of the last record it will automatically stop.

Any record not required to be played may be automatically rejected by moving the control knob to the reject position.

Any record while playing may be repeated by turning the control knob to the "Repeat" position. After the record has been repeated, the changer is automatically tripped, starting a new change cycle and dropping of the next record, unless the record that is repeated is the last record, in which case the changer will automatically shut off.

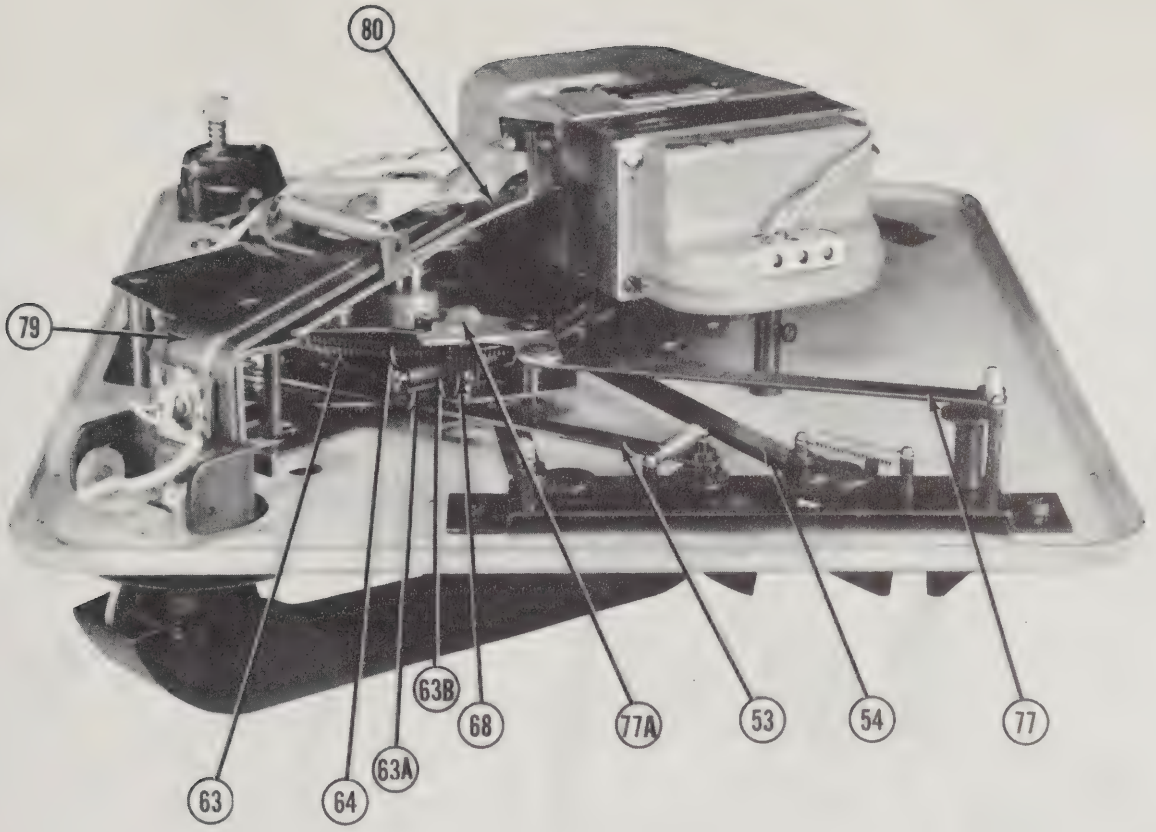
A pause of 2½ minutes' duration between records may be obtained by turning the control knob to the "Pause" position. The changer will maintain the pause between records until the control knob is turned away from the "Pause" position. The change cycle may be resumed any time during the pause by turning the control knob away from the "Pause" position.

CAUTION: Do not force the pause control knob into position. It may be set as soon as the record changer mechanism operates.

The changer can be stopped any time by turning the control knob to the "Stop" position. The changer will start again by turning the knob to "Start," thus resuming playing operation where it was turned off.

CHANGE CYCLE

As the pickup arm moves into the eccentric groove of the record, the stud (F) of the pickup arm control lever (67) moves against the trip lever assembly (34). This causes the trip arm (34B) to pivot inwardly, latching the trip arm finger at point (H) and the clutch stop lever (57). The striker pad (88A), turning with motor spindle (87) and the drive pinion (88), strikes the trip arm surface (G) causing the trip arm to be pushed outwardly; thus, the trip finger pulls against the clutch stop lever and



BOTTOM SIDE VIEW

disengages the clutch lever from the clutch plate. The tension of the clutch plate spring (56) moves the clutch plate in so as to engage the drive pinion (88) and start the change cycle.

The clutch pinion (58) now turns the main drive gear (63) and the pause gear (64). The pinion (68), meshing with both the main gear and the pause gear, keeps the main gear turning until the raised portion of the main gear passes the clutch pinion. The clutch pinion then reengages the main gear and continues to turn the main gear throughout the change cycle.

The main gear is fastened to the shaft of the main cam (83) by set screws; therefore, the main cam turns with the main drive gear (63).

As the cam (83) turns, the finger of the cam lever (80) rides up the groove (J) of the cam. This causes the lift bracket to be pivoted, thus raising the pickup arm off the record. The cam is so shaped that when the finger of the cam lever rides around the top of the cam, the cam lever is pivoted; this moves the pickup arm actuating lever (79A) out which, in turn, moves the pickup arm out clear of the records.

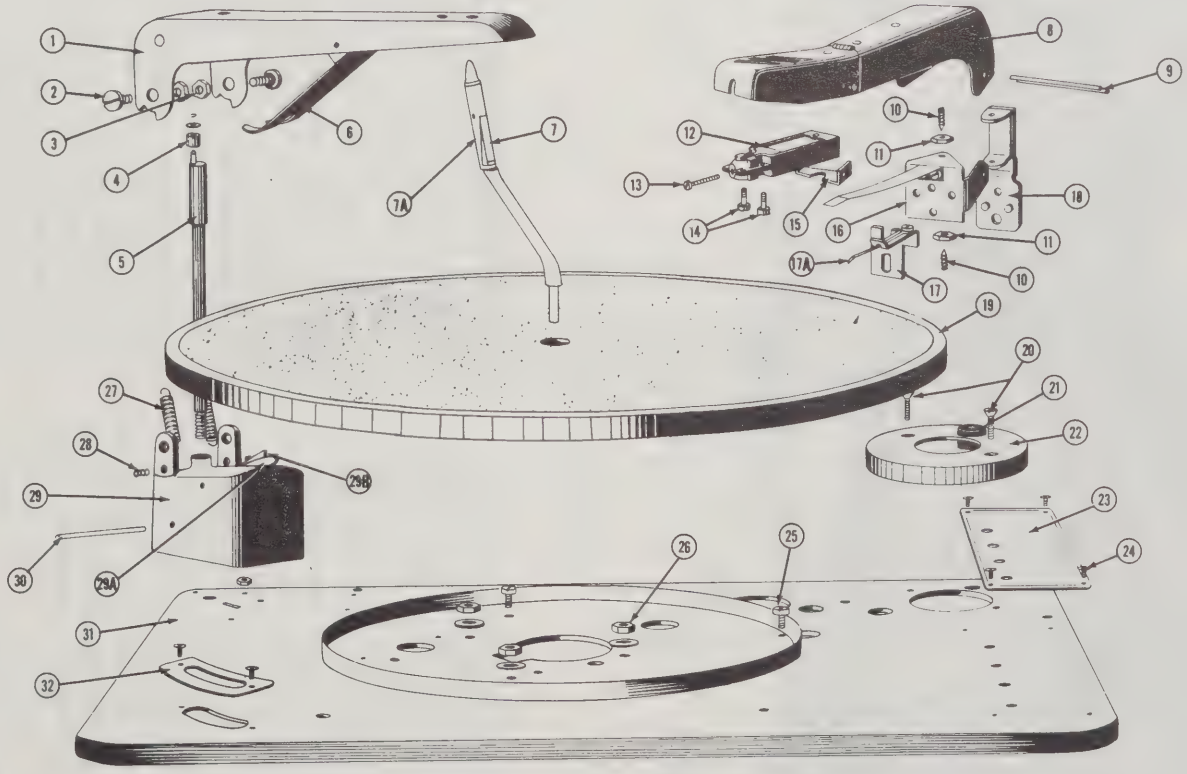
The roller (K) on the main drive gear (63) comes in contact with the cam that is mounted on the ejector lever (59), thus actuating the ejector lever causing it to turn the record selector shaft (5). The selector shaft is fastened to the ejector lever by the set screws (61). As the selector shaft and roller (4) turns, it pulls the push lever actuating link (1A) and adjusting screw (1C) against the push lever (7A) dropping a record to the turntable.

At the same time the ejector lever turns, the stud (L) of the ejector lever turns the selector link (72). When a 12-inch record is to be dropped to the turntable, the weight of the record on the selecting feeler pivots the feeler against the selector latch (42). Therefore, the selector latch is moved against the selector link cam (M). As the selector cam reverses in motion, it is stopped by the selector latch making contact with the step of the selector cam, thus setting the positioner (N) for 12-inch set down. The diameter of a 10-inch record misses the selecting feeler; therefore, it stays in a raised position and the latch will not contact the step of the link cam.

The action of the cam (83) moves the pickup arm actuating lever (79A) in to contact the positioner (N). As the actuating lever moves in, it contacts the end of the (setdown) adjusting stud (67A), thus moving the pickup arm in for set down. For a 12-inch record, the finger (O) of the actuating lever will contact the edge (P) of the positioner (N), and for a 10-inch record, it will contact the step (Q) of the positioner.

The cam lever now rides down the incline of the cam (83), lowering the pickup arm to the record.

The roller (K) of the main drive gear (63) contacts the booster (63A). The action of the booster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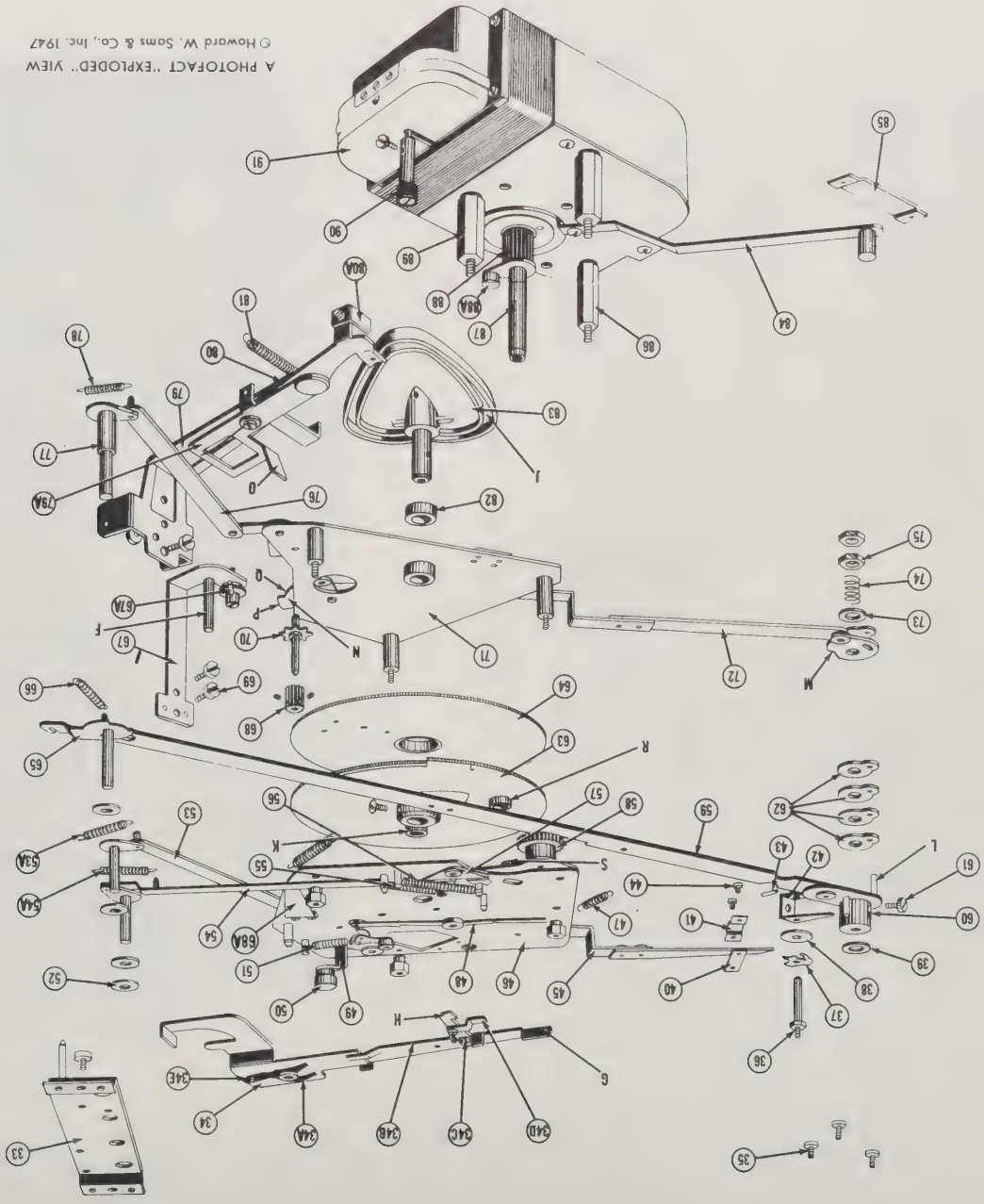
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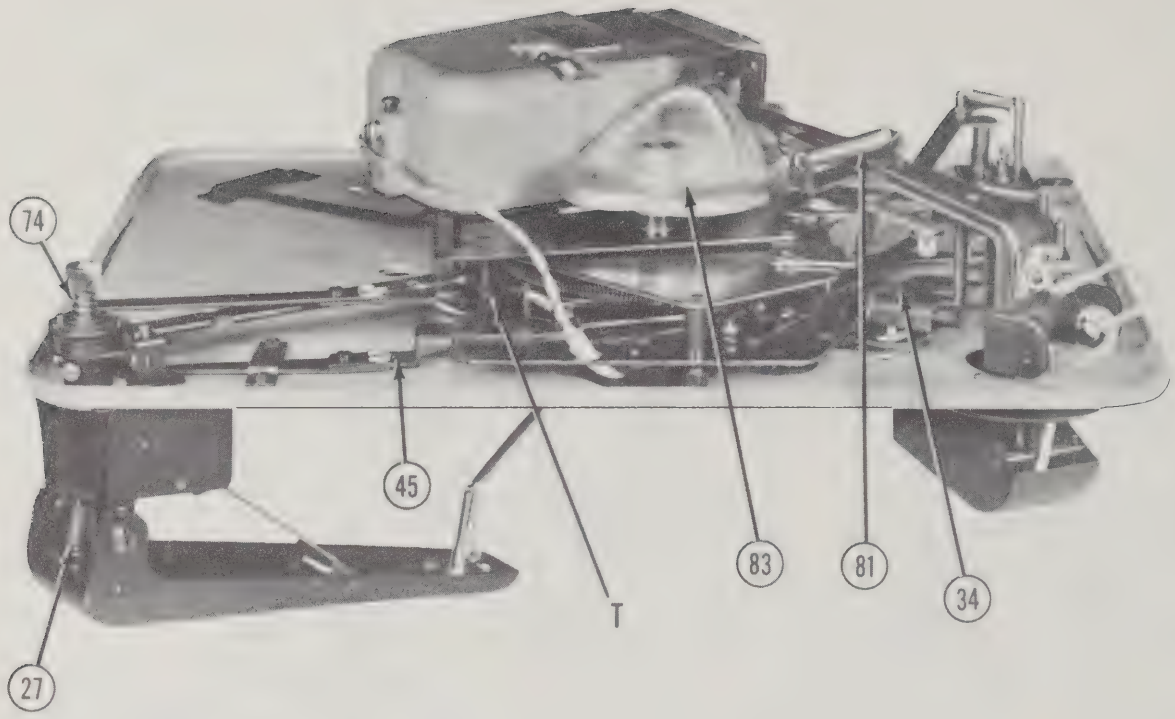


BOTTOM BACK VIEW

spring (63B) and the booster arm now agitates the main gear enough for the roller (R) to strike the stud (S) of the clutch plate. This disengages the clutch pinion (58) and the drive pinion (88) and latches the clutch plate.

PAUSE ACTION

When the control knob is in the "Pause" position, the pinion (68) and the star wheel (70) are raised through the action of the pause cam (77A). The pinion now engages only the main gear (63). As the changer goes into its cycle, both gears (63) and (64) are turned by the clutch pinion (58) until the raised portion of the main gear reaches the clutch pinion. Since the raised portion of the main gear is higher than the teeth of the clutch pinion (58), the rotation of the main gear stops, although the pause gear (64) continues to turn. The main cam (83) which is fastened to the main gear (63) also stops. The finger on the bottom of the pause gear strikes the star wheel on every revolution. The star wheel turns the pinion (68) which turns the main gear a definite amount. This continues for approximately 2½ minutes until the raised portion of the main gear passes the clutch pinion. The teeth of the clutch pinion and the main gear again mesh, thus continuing the change cycle.

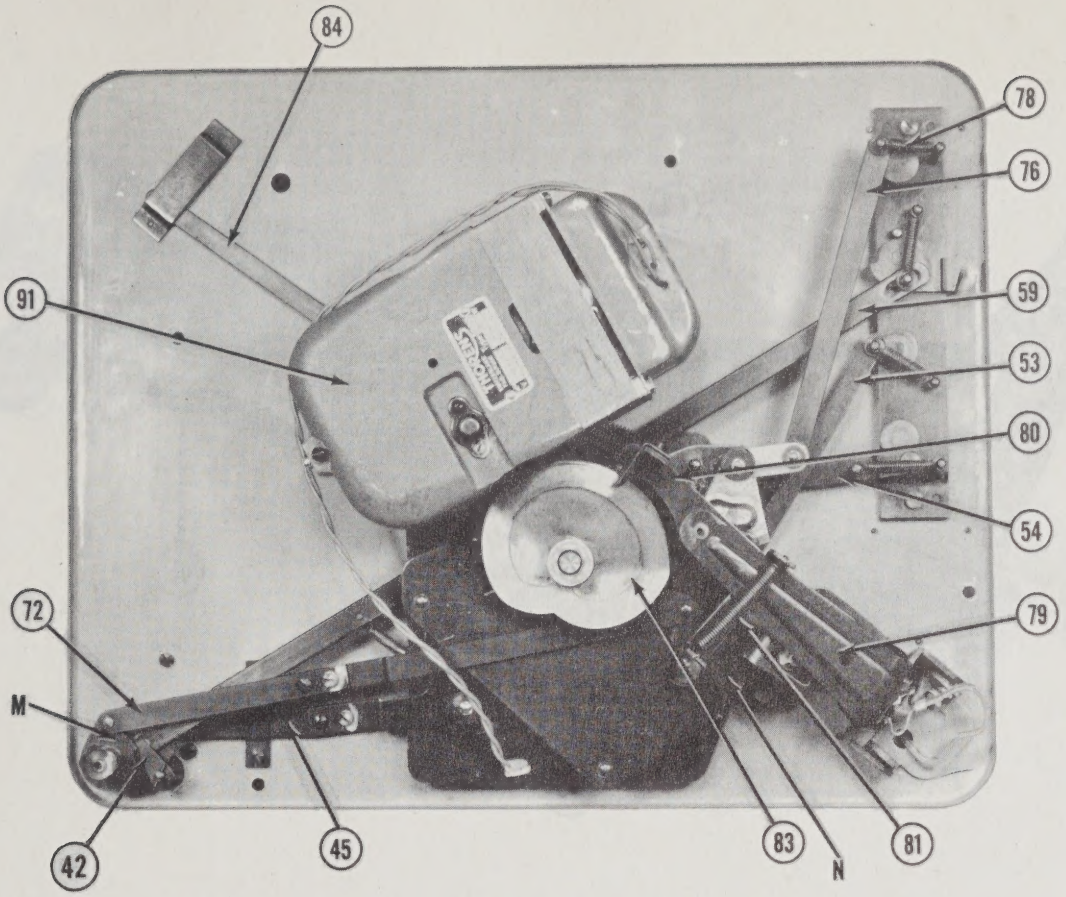
With the control knob out of "Pause" position, the pinion (68) is in mesh with both gears (63) and (64). This keeps the main gear turning when the raised portion reaches the clutch pinion.

REPEAT ACTION

When the control knob is turned to the "Repeat" position, the repeat crank (65) moves the record ejector lever (59) out a definite amount so that the roller (K) of the main gear (63) will not contact the cam on the bottom of the lever (59). Therefore, the record dropping mechanism is not actuated and pickup arm will set down on the same record. As the pickup is being lowered to the record, the roller (R) moves against the back of the cam on the ejector lever. This moves the control knob off "Pause" position, thus returning the ejector lever to its normal position.

SHUT OFF MECHANISM

With the presence of records resting on the stop feeler (29A), the end of the stop feeler extending below the base plate is pivoted away from the end of the stop lever (45). This allows the stop lever, when contacted by the roller (R) of the main cam (63), to pivot freely on the pin (T) of the trigger lever (48) which extends down through the upper control plate (46).



BOTTOM VIEW

When the last record drops to the turntable, the stop feeler raises; therefore, the end extending below the base plate moves in front of the stop lever. When the last record is finished playing and the change cycle is in motion, the roller (R) of the main gear (63) contacts the stop lever. The stop feeler now blocks the free action of the stop lever causing it to pull against the pin (T) (instead of pivot). This action unlatches the trigger lever (48) and the switch and brake bracket (49). The spring (51) pulling against the bracket (49) actuates the bracket, thus shutting off the motor and stopping the turntable. The roller of the bracket extending down through the upper control plate moves with the bracket and against the tapered end of the start link (53), thereby moving the control knob to the "Stop" position.

ADJUSTMENTS

Pickup Arm Height

The pickup arm is adjusted so that when the arm is lowered the needle of the pickup arm will be level with the velvet of the turntable. To adjust the pickup arm, bend the pickup rest spring (17A) slightly.

Pickup Landing Position

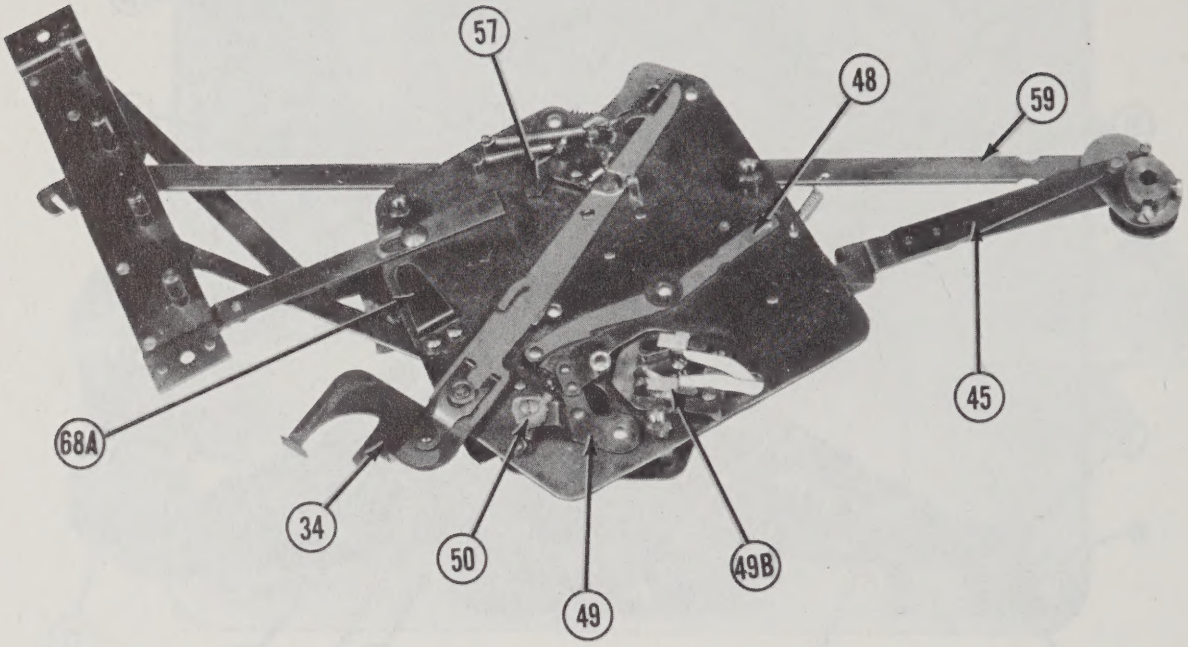
The landing position of the pickup arm should be approximately ⅛" in from the edge of the record. With the power plug out, turn the control knob to "Start." Turn the control knob to "Reject." Turn the turntable, by hand, and note where the needle first touches the record. The point at which the needle drops on the record may be adjusted by turning the adjusting stud (67A). This adjusting stud can be reached through the hole (67B) (picture of top view less turntable) when the pickup is placed on the first groove of a 10-inch record.

Automatic Shutoff Lever

After the last record drops to the turntable, the stop feeler (29A) falls in front of the stop lever (45), thus blocking the free movement of the stop lever. If the stop lever is too short to strike the feeler, lengthen the lever by loosening the regulating screws. When the last record is finished playing, the stop lever strikes the feeler, thus actuating the shutoff mechanism.

Automatic Trip Mechanism

If at the end of a record the automatic trip does not operate, the following adjustments can be made. Turn the control knob to the "Off" position and remove the turntable. Examine the trip lever leather; if this is worn, give it half a turn so that a new surface faces the striker. If it is badly worn, it should be replaced. If the leather is in good condition, then increase the tension of the friction spring



UPPER CONTROL PLATE ASSEMBLY

(34A) by turning the friction adjusting screw (34E) in a counterclockwise direction, about half a turn.

The Turntable Brake

The turntable brake is connected to the automatic switch. If the brake pad becomes worn, it will allow the turntable to overrun resulting in the first record not dropping when the changer is switched on. This can be rectified by slightly turning the leather pad so a new surface will be next to the turntable rim.

TROUBLES

Records Fail to Drop

1. Check the screws (61); they may be loose, thereby not turning the selector shaft.

2. Screw (1C) of the overarm is not adjusted correctly; therefore, it does not actuate the record push lever (7A) when the push lever actuating link is pulled.

Pickup Height Incorrect

1. If the pickup arm does not touch the first record on the turntable, or will not clear the last record on the turntable, the following adjustment can be made:

   (a) Bend the pickup rest spring (17A) slightly in the direction needed to correct the trouble.

Pickup Arm Does Not Land Correctly on a Record

1. Check the pickup arm for binding.

2. Check the adjustment of the adjusting stud (67A).

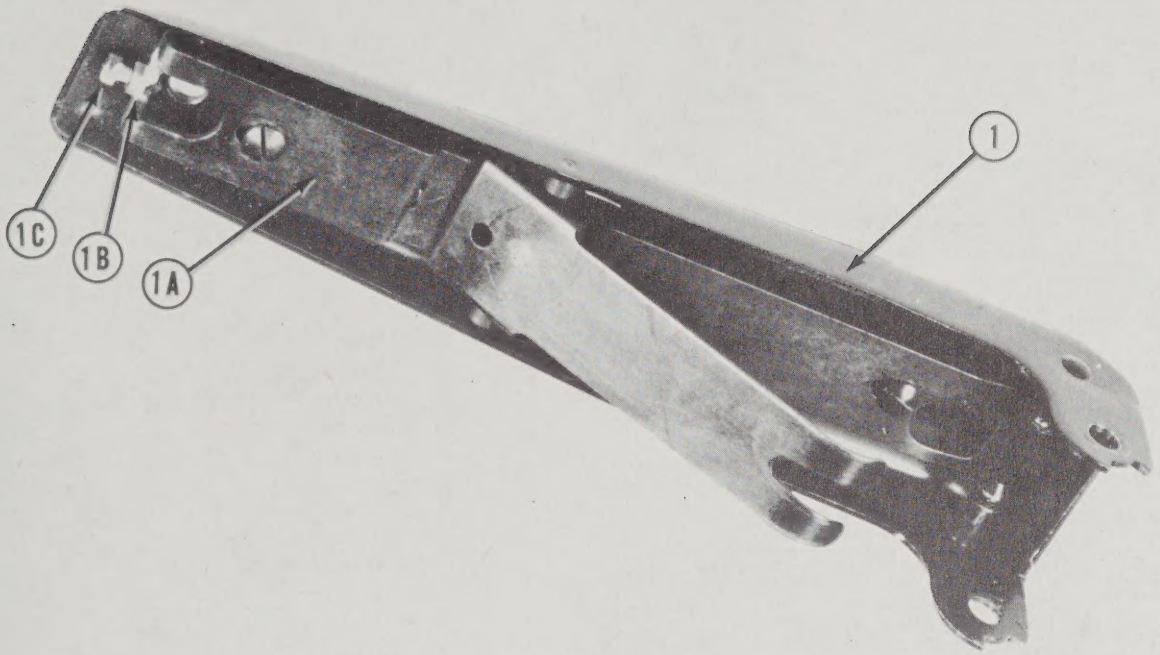
   (a) With the power plug out, turn the control knob to "Start."

   (b) With a 10-inch record on the turntable, rotate the turntable, by hand, and note where the needle lands. This correct landing position should be ⅛" in from the edge of the record. To make this adjustment, turn the adjusting stud (67A). Clockwise direction moves the pickup arm in; counterclockwise moves the pickup arm away from the center. The adjusting stud can be reached through the hole (67B) (picture of top view less turntable) when the pickup is placed on the first groove of a 10-inch record.

Continuous Cycling

The continuous cycling of the changer may be caused by:

1. The spring (55) of the clutch stop lever is loose or missing, causing the clutch plate not to be latched.



BOTTOM VIEW OVERARM

2. The clutch stop lever (57) binding.

The Changer Does Not Trip at the End of a Record

1. Examine the leather striker (88A). If this is worn, give it half a turn so the new surface is next to the trip arm (34B) surface (G).

2. If the leather striker is good, increase the tension of the automatic trip friction spring (34A) by turning the adjusting screw (34E) about half a turn in a counterclockwise direction.

The Pause Lasts Indefinitely

If the pause of the change lasts indefinitely, the following procedure should be employed in locating the fault:

1. Check the finger on the bottom of the pause gear (64) to see if it is bent or broken. In either case, the finger will not strike the star wheel, thereby not actuating the star wheel (70) which turns the pinion (68) and the main drive gear (63).

2. Check the pinion (68); it may be loose on the shaft of the star wheel (70).

The Last Record Will Not Repeat

1. Bend the small tongue of repeat crank (65) by using a screwdriver in the slot. The tongue should contact the shoulder of the stud of the start and stop link crank. This prevents the start link (53) from being moved forward, thus preventing the changer from being shut off.

The Record Changer Does Not Shut Off After the Last Record

1. Check the stop feeler (29A) for binding.
2. Spring (51) loose or missing.
3. Check the stop lever (45) to see if it strikes the stop feeler, taking into consideration that the stop feeler is working freely in the platform. If the stop lever is too short to strike the feeler, lengthen the lever by loosening the two adjusting screws.

Pickup Arm Does Not Set Down for 12" Records

1. Check the selecting feeler (29B) for binding.
2. Check the selector latch (42) for binding.

LUBRICATION

The motor and the changing mechanism should be lubricated, generally after 100 to 150 hours' use. Remove the turntable and drop a few drops of good quality thin oil into the lubricating holes (colored red). After a few years' use, it would be advisable to clean off all the old grease with carbon tetrachloride. Then put a good grease on all the cams, gears and other rubbing surfaces.

Do not oil the selecting feeler and the stop feeler.

PARTS IDENTIFICATION LIST

Ref. No.	DESCRIPTION	Ref. No.	DESCRIPTION
1	Overarm	46	Upper control plate
1A	Push lever actuating link	47	Ejector lever spring
1B	Lock nut	48	Shut-off trigger lever
1C	Adjusting screw	49	Switch and brake bracket
2	Pivot screw for overarm	50	Brake pad
3	Nut for overarm pivot screw	51	Brake spring
4	Record selector roller	52	Flat washer
5	Record selector shaft	53	Start link
6	Record stabilizer	53A	Start lever spring
7	Spindle (complete)	54	Reject lever
7A	Record push lever	54A	Reject lever spring
8	Pickup arm	55	Spring for clutch stop lever
9	Pivot rod	56	Clutch plate spring
10	Cone point set screw	57	Clutch stop lever
11	Lock nut	58	Clutch pinion
12	Cartridge—pickup	59	Record ejector lever
13	Needle screw	60	Ejector lever crank
14	3-56 x 11/32" cartridge mounting screws	61	Screw for feeding mechanism shaft
15	Cartridge support	62	Clutch washers
16	Pickup mounting hinge	63	Main cam drive gear
17	Rest spring bracket	63A	Booster
17A	Pickup rest spring	63B	Booster spring
18	Pickup arm pivot bracket	64	Pause gear
19	Turntable	65	Repeat crank
20	Screw for pickup base cover	66	Repeat lever spring
21	Grommet	67	Pickup arm control lever
22	Pickup base cover	67A	Screw (set-down) adjusting stud
23	Control escutcheon	68	Pinion
24	Screw for escutcheon	68A	Spring for pause pinion
25	Control plate mounting screw	69	Pickup mounting screw
26	Motor mounting nut	70	Star wheel
27	Overarm spring	71	Lower control plate
28	Stop screw for overarm	72	Selector link
29	Overarm platform	73	Flat washer
29A	Stop feeler	74	Friction spring for selector
29B	Selecting feeler	75	Selector adjusting nuts
30	Pin for springs (27)	76	Pause lever
31	Base plate	77	Pause control crank
32	Speed control escutcheon	77A	Pause cam
33	Control shaft mounting plate	78	Pause lever spring
34	Trip lever assembly	79	Lift bracket
34A	Automatic trip friction spring	79A	Pickup arm actuating lever
34B	Trip arm	80	Cam lever
34C	Trip spring	80A	Retaining bracket
34D	Trip lever stop	81	Pickup lateral displacement spring
34E	Automatic trip adjusting screw	82	Spacer for main cam
35	Platform mounting screw	83	Main cam
36	Selector pivot pin	84	Speed adjustment lever
37	Spring washer for selecting latch	85	Bracket for speed lever
38	Flat washer for selecting latch	86	Motor mounting studs
39	Washer	87	Motor spindle
40	Guide plate	88	Drive pinion
41	Lever guide bracket	88A	Leather striker pad
42	Selector latch	89	Motor mounting stud
43	Pin for selector guide rod	90	Voltage adjusting screw
44	Screw guide bracket	91	Motor assembly
45	Stop lever		